

LIFE OF THE
BLIND INVENTOR,
DR. JAMES GALE.

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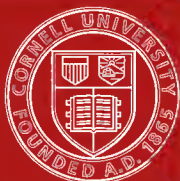
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THE
STORY OF A BLIND INVENTOR;
BEING
SOME ACCOUNT OF THE LIFE AND LABOURS
OF
DR. JAMES GALE, M.A., F.G.S., F.C.S.



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J. Gate

THE STORY
OF A
BLIND INVENTOR;

BEING SOME ACCOUNT OF
THE LIFE AND LABOURS
OF
DR. JAMES GALE, M.A., F.G.S., F.C.S.,

INVENTOR OF THE NON-EXPLOSIVE GUNPOWDER PROCESS, ETC., ETC., AND
FOUNDER OF THE SOUTH DEVON AND CORNWALL INSTITUTION FOR
THE INSTRUCTION AND EMPLOYMENT OF THE BLIND.

BY
JOHN PLUMMER.

“——With the year
Seasons return; but not to me returns
Day, or the sweet approach of ev'n or morn,
Or sight of vernal bloom, or summer's rose,
Or flocks, or herds, or human face divine:
But clouds instead, and ever-during dark
Surrounds me.”

Milton's "Paradise Lost."

“The blind shall see out of obscurity, and out of darkness.”—*Isaiah xxix. 18.*

LONDON:
WILLIAM TWEEDIE, 337, STRAND, W.C.
—
1868.

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LONDON:

PRINTED BY THOMAS COOK, 98, FLEET STREET, E.C.

TO THE
RIGHT HONOURABLE
EARL SPENCER, K.G.,
THIS LITTLE MEMOIR
OF A
BLIND INVENTOR .
IS RESPECTFULLY DEDICATED
BY THE AUTHOR.

WHEN I consider how my light is spent
E'er half my days in this dark world and wide,
And that one talent which is death to hide,
Lodg'd with me useless, though my soul more bent
To serve therewith my Maker, and present
My true account, lest He returning chide ;
Doth God exact day labour, light deny'd,
I fondly ask ? but patience to prevent
That murmur soon replies, God doth not need
Either man's work or his own gifts ; who best
Bear his mild yoke, they serve Him best : his state
Is kingly ; thousands at his bidding speed,
And post o'er land and ocean without rest ;
They also serve who only stand and wait.

Milton.

ERRATA.

Page 72, line 18, for canal read *brook*.

Page 159, line 25, for 1815 read 1865.

Page 185, line 9, for Marshwood read *Marchwood*.

PREFATORY NOTE.

THE compilation of this little memoir of a very remarkable individual has been considerably facilitated by the kind assistance which the author has received from various friends of Dr. James Gale, to whom also he is indebted for many details not otherwise procurable, and for the rectification of various inaccuracies which have crept into some of the published accounts of the inventions alluded to in the latter portion of this work.

The idea of the author was to bring forward, in a comprehensive and popular form, everything of public interest relating to an inventor whose history not only offers a bright and encouraging example of the power and value of self-help, but also tends to afford considerable encouragement to those engaged in the pursuit of knowledge under difficulties, by showing how perseverance and energy can vanquish the most formidable obstacles, converting impediments into so many stepping-stones towards success. To those taking an interest in the welfare of

that numerous class who have the misfortune to be deprived of the blessings of sight, the Story of the Blind Inventor will—so trusts the author—furnish both information and pleasure, and tend to quicken their sympathies on behalf of their sightless brethren.

With the view of rendering the Memoir as useful and popular as possible, all technical details and explanations, excepting those which were absolutely necessary, have been omitted, thereby rendering the history and description of the various inventions more intelligible to the general reader. It will also be found that the different authorities to which recourse has been had have been duly acknowledged, every care being taken to test the accuracy of the accounts furnished by the various leading newspapers and scientific journals respecting the experiments performed in connection with the inventions mentioned in the present volume.

The autograph inserted below the portrait of Dr. Gale is a *fac-simile* of one written by him within the last few weeks, and is interesting as a specimen of unassisted writing by a person totally blind.

LONDON, APRIL, 1868.

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THE STORY OF A BLIND INVENTOR.

CHAPTER I.

“Lovely Devon, land of flowers and songs.”

Carrington.

“The grand old men of Devonshire,
How mighty is their name.”

Edward Capern.

CONCERNING DEVONSHIRE AND THE GALE FAMILY.

IF there be one county which, more than any other, we may regard as typifying the leading peculiarities of our national character, the numerous traits and incongruities which collectively constitute the Englishman, that county is Devonshire, whose surf-washed shores, above which rise the stately cliffs in all their dazzling whiteness, shared with those of the neighbouring county of Cornwall the honour of beholding the first landing of the great

sea-princes of old—the hardy and adventurous Greek and Phœnician merchant-sailors, who brought with them the germs of that mighty spirit of civilisation which, in modern times, has placed England in the van of the Peace, Liberty, and Progress-loving nations of the earth.

The English people have been contradictorily described as “sour, splenetic, and stubborn,”—and as “mild, sweet, and sensible,” the truth evidently being, as remarked by Emerson, that we have great range and variety of character, to an extent, probably, such as no other people can boast of. And so it is with Devonshire. “Here,” says an able writer, “are to be found the garden of England and its desert; sheltered vales, over-arched by a green vault of leaves, and strewn with flower and fern, and a waste, howling wilderness, where the foot of the wayfarer sinks through the treacherous peat, or stumbles over the boulders that lie scattered on the hill side. This same county contains the lowest land in England, land that is said to lie beneath the level of the sea—and some of the highest land, hills that rise two thousand feet above the sea. These sterile granite wastes actually touch the fertile sandstone plains at their feet. A pedestrian may easily in the course of a single day, pass from wooded dales, where the trees bend down and kiss the sea, and picturesque villas are fronted by green lawns and

brilliant tinted parterres, to a seemingly boundless moorland, shunned by man and forsaken by God."

All who have written respecting the physical features of Devonshire, concur in describing it as a county extremely rich in the possession of beautiful and wildly romantic scenery, blessed in many places with a climate so soft and genial as to remind the traveller of that fair and classic land, consecrated with a thousand glorious associations of heroic deeds and noble achievements,—a land:—

"Where none that lives to love her but adores,
Where, with her balmy winds and blushing bowers,
Pass in a dream life's unnumber'd hours."

Truly may Devonshire be denominated the "Italy of the West." The warm sunny atmosphere of the bright Italian mountain ranges is not more salubrious, more delightfully pleasant, than that of Torquay and other favourite Devonian places of tourist and invalid resort, where the cooling sea-breezes render the air deliciously mild in summer, and where the bitter rigours of our cold northerly winters are comparatively unknown.

All the various charms and glories of nature seem to be concentrated in this favoured portion of our island. The artist in search of the picturesque here finds all that he can possibly desire: and luxuriant magnificent views, canopied by gorgeous skies, such as Claude or Turner delighted in reproducing on the

inanimate canvass, and "where the clouds rising from the sea, and driven back by brisk winds over a surface so much diversified, by contrasts and varieties of brilliant lights and deep shades, produce effects on the landscape the most striking, beautiful, and even grand."* Here, too, the enthusiastic votary of the poetic muse has frequently derived his inspiration as, reclining on the "gay enamelled slopes," bedecked with flowers innumerable, he dreamily gazed where—

"The countless brooks
With an undying verdure fring'd, roll on
Melodiously their waters ;"

Or mused with thoughtful soul on the ancient history of the stern and solitary moor where we sadly miss the gentle loveliness of the neighbouring vales, and where :—

"The king-cup bright,
In glossy gold,—the daisy, silver rayed,—
And sapphire-tinctured violet, and, wreath'd
With snow, the hawthorn,—and the harebell, blue
As ocean :—all, all are vanished,—all at once,
As if some spell had cursed the ground. The rocks
Terrific rise, clasping a rugged dell :
And into it, loud thundering o'er the steeps,
The mountain rivers rush."†

It would need the pen of a Dante, or the pencil

* Moore's History and Topography of Devonshire.

† Carrington.

of Gustave Doré, to describe with appropriate power the strange and weird-like region of extensive moors, barren wastes, solitary glens, wild morasses and towering rocks, known as Dartmoor Forest.

Here nature sullenly bids defiance to man, and mockingly bids him cultivate the sterile plain or convert the herbless surface of the timeworn granite tors into richly blooming gardens. A strange and indefinable feeling takes possession of our minds as, with bated voice and hushed step, we slowly wander amid the ancient relics of a past age, the mysterious stone circles that yet bewilder the antiquary and ceaselessly baffle the researches of the learned into their history. The storms of centuries have swept harmlessly over these vestiges of Druidical worship:—

“ Still these nameless chroniclers of death,
Midst the deep silence of th’ unpeopled heath,
Stand in primeval artlessness, and wear
The same sepulchral mien, and almost share
Th’ eternity of nature, with the forms
Of the crown’d hills beyond.”*

Near us are traceable the remains of the rude stone huts, once the habitations of our early ancestors—the fierce Danmonii, and as we gaze with ever-increasing interest on these mouldering monuments of an epoch when civilisation was yet in its infancy,

* *Mrs. Hemans.*

we cannot resist the ineffaceable impression produced by the consciousness that, within sight of these remains, may be viewed one of the latest triumphs of modern civilisation, the famous tubular railway bridge across the stately Tamar; for even thus are the two extremes of civilisation brought within sight of each other in an English county.

The history of Devonshire is almost as remarkable and interesting as is its physical appearance. From the far-off period—more than twelve hundred years ago—when patriotic Britons and invading Saxons fiercely contended with each other for the mastery, to that momentous day when the great Conqueror of modern times lay confined a prisoner on board a British war-vessel in Plymouth Sound, of what a strange and stirring succession of historical incidents has Devonshire been the scene. Now battling with the fair-haired Saxons, now grimly confronting the savage Norseman, now sternly resisting the invading armies of Norman William, the ancient men of Devonshire ever displayed the same noble-hearted patriotism, sturdy pride, and lion-like fearlessness, which in after years, shone forth in the deeds of Drake, Hawkins, and other naval warriors. How well and how characteristically the famed Devonian pluck and gallantry exhibited itself when Oddune, Earl of Devonshire, suddenly emerging, with a few followers from Kenworth Castle, to which the superior force of

the Danish invaders had compelled him to retreat, fell like a lightning stroke upon the enemy's camp, slew their leader Hubba, together with twelve hundred of his men, driving the others to their ships, and triumphantly capturing the *Reafen*, the famous Norse standard of the Raven, woven in one noon-tide, with many incantations, by the three sisters of Hubba. It was ever so.

The men of Devonshire have always been :—

“ For ancient valour and for prowess fam'd,
Renowned in battle, and, as records tell,
In combat foremost to repel the foe.”*

We are reminded, and most truly so, by the Reverend Charles Kingsley, in his “ Westward Ho ! ” that grand prose Idyll of Old Devonshire life, that “ It is to the sea life and labour of Bideford, and Dartmouth, and Topsham, and Plymouth (then a pretty place), and many another little western towns, that England owes the foundation of her naval and commercial glory. It was to the men of Devon, the Drakes and Hawkins', Gilberts and Raleighs, Grenvilles and Oxenham's, and a host more of forgotten worthies, whom we shall one day learn to honour as they deserve, to whom she owes her commerce, her colonies, her very existence.” Never will it be forgotten by us, English men and English women, how, when the so-called invincible

* Gompertz.

Spanish Armada threatened with destruction the glorious liberties inherited by us from our forefathers, the men of Devonshire, Britain's sturdy seadogs, were among the earliest who prepared to fight to the death in defence of their native land ; or that it was to their coast, to "Plymouth's famous Sound," that came the first tidings of the arrival of 'Castile's black fleet,' like a flight of vultures, in English waters. Macaulay's magnificent poem well expresses the dauntless spirit and determination evinced by the proud Devonians when—certain of the approach of England's arrogant foe—they tightly clenched the hilts of their swords, and kept grim watch to seaward. There was no faltering on their part then. The compressed lips and gleaming eyes betokened ill for the Spanish invader, should he attempt to fulfil his threat. The fiery beacon that "blazed upon the roof of Edgcombe's lofty hill," but typified the burning ardour of the Devonshire men, so grandly described by Macaulay, in our now national ballad, wherein he tells us how the alarm was sounded from Plymouth Bay, and how :—

"With his white hair, unbonnetted, the stout old sheriff comes,
Behind him march the halberdiers, before him sound the drums,"

And how, in proud defiance, the Devonshire men raised aloft the standard of their beloved Queen, while :—

“ — haughtily the trumpets peal, and gaily dance the bells,
 As slow upon the labouring wind the royal blazon swells.
 Look how the lion of the sea lifts up his ancient crown,
 And underneath his deadly paw treads the gay lilies down !
 So stalked he when he turned to flight, on that famed Picard
 field,

Bohemia's plume, and Genoa's bow, and Cæsar's eagle shield :
 So glared he when, at Agincourt, in wrath he turned to bay,
 And crushed and torn, beneath his claws, the princely
 hunters lay.

Ho! strike the flagstaff deep, sir knight! ho! scatter flowers,
 fair maids!

Ho! gunners! fire a loud salute! ho, gallants! draw your
 blades!

Thou, sun, shine on her joyously! ye breezes, waft her wide!
 Our glorious *semper eadem!* the bauner of our pride!”

But not alone as warriors or patriots have the people of Devonshire distinguished themselves. No county is more rich in the biographies of great and good men, who have gained for themselves an honoured name in the annals of their country. Amongst learned ecclesiastics and divines may be mentioned Winnifred, surnamed Boniface, “the apostle of Germany,” Bishop Jewel, Dr. Hawkins, Hooker, Dr. Prideaux, and we know not how many beside. Then come a long array of eminent statesmen, judges, lawyers, antiquarians, travellers, poets, scholars, painters, and authors. John Davis, who discovered the Straits bearing his name, was a Devonshire man, as was Sir Humphrey Gilbert, the famous

Arctic adventurer, of whom Longfellow has sung how :—

“ He sat upon the deck,
The Book was in his hand ;
‘ Do not fear, Heaven is as near,’
He said, ‘ by water, as by land.’ ”

Besides these two celebrities, Devonshire has owned Sir Martin Frobisher, and a host of others whose courage and intrepidity in the presence of danger assisted materially in gaining for our country its matchless naval reputation. Sir Walter Raleigh was a native of Devonshire, as were also Sir Thos. Bodley, founder of the celebrated Bodleian Library at Oxford ; Browne and Peele, the poets ; Lord Audley, the “ Hero of Poitiers,” and numerous others. There was scarcely a family in the county which had not, at one time or another, supplied men of more than mere local repute, or who occupied a conspicuous part in one or more of the historical episodes of which Devonshire has so frequently been the picturesque scene. The famous old Welsh country song tells us that :—

“ It was among the ways of Good Queen Bess,
Who rul’d as ever mortal can, sir,
When she was *stogged*, and the country in a mess,
She was wont to send for a Devon man, sir.”

Stogged signifies in a dilemma ! Various other allusions, of a similar character, are to be found scattered throughout our national ballad literature.

Amongst the more celebrated of the ancient Devon-

shire families, may be mentioned the Grenvilles, Fulfords, Herles, Cuwys, Glanvilles, Courtenays, Fortescues, Hills, Petres, Carews, De Bathes, Carys, and others; some of which trace their origin to a period long anterior to the Norman Conquest. The history of several of these families is remarkable for its illustration of the instability of worldly rank and wealth, for although many of them have survived, unscathed, the cruel wrecks of time, still bearing the honoured names and holding the ancient possessions of their forefathers, yet there are not a few whose descendants have become merged in the general population of the county, and whose names find not a place in the works of Debrett, Burke, Dodd, or Walford. Men whose fathers had gained their hard-won distinctions on the battlefield, or in the halls of learning, may oft-times be found patiently following the occupation of traders, or practising the humble calling of the mechanic. In his "Vicissitudes of Families," Sir Bernard Burke, alluding to this fact, remarks that, "in the ranks of the unennobled aristocracy, time has effected wondrous changes. The most stately and gorgeous houses have crumbled under its withering touch. Let us," he continues, "cast our eye on what county we please in England, and the same view will present itself. Few, very few of the old historic names that once held paramount sway, and adorned by their brilliancy a particular locality, still exist in a *male* descendant."

The Gale Family, of Crediton and Dartmouth, and latterly of Tavistock, was amongst the oldest families in Devonshire.* It is stated that "many members of the family were famed for physical prowess and success in war; and their general character was that of inflexible integrity and stability of purpose, and though terrible in the field, peaceful, domestic, and promotive of industrial arts, when wrongs had been redressed and justice vindicated." The Gales were allied by marriage to some of the best and most ancient families in the county. Thus we read that Alice Gale was married to John Bodley, of Exeter, a member of that branch of the Bodley family to which the celebrated Sir Thomas Bodley belonged. Most theologians are familiar with the name of Theophilus Gale, who flourished during the reign of Charles II. He was the son of Dr. Theophilus Gale, Vicar of King's Teignton, and one of the prebendaries of Exeter cathedral. His great learning and high acquirements gained for him an university degree long before the usual time, the university rules being specially relaxed in his favour; but, joining the Nonconformists, he found himself without hopes of preferment in the church, for whose pulpit he had been specially trained. Upon this he became family tutor to the grandfather of the

* Ridsen twice mentions the name of Gale in his list of Devonshire Families.

celebrated Philip, Lord Wharton, and for some time lived on the Continent. Returning to England, he had a narrow escape from having his MSS. and books destroyed during the great fire of London. Settling at Newington, he devoted himself to the preparation of various theological works, some of which were afterwards republished by his son, and appears to have enjoyed the respect and esteem of his contemporaries, no matter how great might be their differences of opinion on subjects connected with politics or religion. In some of the old county documents the name of Gale frequently appears, but it is by tradition that the earlier history of the family is best known, for its reputation was principally acquired at a time when books were both scarce and dear, and when the sword was more frequently employed than was the pen. In Burke's "Heraldry," the crest of the Gale family is represented as "a shank-bone and palm-leaf;" certainly a most significant symbolical device, and one harmonising well with the traditional characteristics of the family. Crediton, the ancient seat of the Gales, is a town about seven or eight miles north of Exeter, and was formerly celebrated for its serge manufacture. A collegiate church is said to have been existing here early in the time of the Saxons, a circumstance showing the antiquity of the place. Crediton is also traditionally believed to have been the birth place of St. Burchard, a celebrated Anglo-Saxon Saint, of whom many things are related. At

the time of the Reformation, the town was for a short period in the hands of the infuriated insurgents who had risen in defence of the old order of things, but these were ultimately dispersed by the forces under the command of Sir Peter and Sir Gawen Carew. During the civil war, Crediton became the scene of several fierce conflicts between the Royalists and Parliamentarians. Dartmouth, the second seat of the family, is pleasantly situated on that portion of the Devon coast, where the river Dart emerges into the sea, about thirty miles south-by-west of Exeter. Its history is not uninteresting, for it was early a place of note, and in 1190 formed the rendezvous of the invading fleet, destined for the Holy Land, in which expedition several of the Gales are traditionally asserted to have taken part. In Yorkshire there exists an ancient family of the name of Gale, but its arms and crest are essentially different from those of the Devonshire family, although it is not improbable that both families may have sprung from the same root. The learned Thomas Gale, Dean of York, author of several valuable works, and who wrote the inscription in St. Paul's Cathedral, relative to the great fire of London; and Roger Gale, his son, who occupied the important position of vice-president of the Society of Antiquaries and treasurer to the Royal Society, belonged to the Gales of Yorkshire.

Such was the county and such was the family to which belonged James Gale, whose remarkable and

instructive history we are about to trace, forming as it does a striking and encouraging example of the successful pursuit of knowledge under difficulties of the gravest and most disheartening character; and showing how a persevering application of the principles of self-help enables even the most afflicted to triumphantly surmount the numerous disadvantages occasioned by their infirmities, and become an assistance, rather than an incumbrance, to their fellow men. The father of James Gale was, at the time of his son's birth, employed as manager of an extensive coal store, at Crabtree, near Plymouth. This was in 1833, when the flames of political agitation had somewhat subsided, and people were more closely turning their attention to the requirements of trade and commerce. While James was yet a mere child, his parents removed to Tavistock, with the beautiful scenery surrounding which, he, during his youthful years, became intimately acquainted, little dreaming that long before he had attained life's golden prime, the face of nature would become to him a dark and empty void—a dreary, mist-like blank in which form and colour existed not. Well is it for us that we cannot always read the pages of the future. Were it otherwise, not alone to the blind, would the world appear dark and sunless. There would be many, very many, to whom life and its prospects would seem a grim and cheerless mass of shadows, clouds, and fear-inspiring darkness.

CHAPTER II.

“How sweet, while all the evil shuns the gaze,
To view the unclouded skies of former days.”

Henry Kirke White.

“There is a history in all men's lives
Figuring the nature of the times deceas'd ;
The which observ'd, a man may prophesy,
With a near aim, of the main chance of things
As yet not come to life ; which in their seeds,
And weak beginnings lie intreasur'd.”

Shakespeare's King Henry IV., Part II.

GLIMPSES OF BOY LIFE.

IT has been most correctly observed that* “the influence of physical causes in the formation of intellectual and moral character, has never been sufficiently regarded in any system of education. Organic structure, temperament, things affecting the senses or bodily functions, are as closely linked with a right play of the faculties, as the materials and con-

* Aphorisms and Reflections by *W. B. Clulow.*

ditions of an instrument of music with that wonderful result called melody." The history of James Gale affords an interesting example of the truth contained in these remarks. While yet a mere child, he is said to have been exceedingly fond of athletic sports and amusements, his predilection for which was evidently derived from his father, who, in his younger days, had acquired considerable local reputation as a skilful skittle-player. Indeed, it was asserted that his match could not be found in that part of the country in which he then resided. Skittle-playing at that time held a considerably higher place in the estimation of the general public than at present, when it has degenerated into a mere public-house pastime, usually carried on in close, reeking sheds, and rendered notorious as a safe and easy medium for enabling crafty sharpers to fleece unsuspecting simpletons. The game can boast a very respectable antiquity. It is, with much reason, believed to have been originally derived from the French sport of *Quilles*, and, under the name of *Kayles*, evidently a corruption, to have achieved a widely spread degree of popularity in the southwestern portions of the kingdom. The rules of the game were much the same as those used in modern skittle-playing, except that the Kayle-pins were placed in a row, instead of a square, and that each pin was broad at the base and tapered gradually towards the top. In Strutt's "*Sports and Pastimes*," is to be

found a representation of the game. The Devonshire skittle-players, like those of Cornwall, were famous throughout the kingdom. They also excelled in the game of "four corners," so called from four large and extremely heavy pins placed singly at each angle of a square. To excel in this kind of pastime required considerable experience, and a large amount of strength on the part of the player. Four corners is still a popular game. A love of athletic sports forms one of the principal characteristics of the Devonshire people. Risdon, writing in 1630, says of the Tavistock labourers, that "they be both of strong body, able to endure all labours and pains; who upon the holidays and times of leisure, give to themselves such exercise and pastimes as do rather enable their bodies to strength than otherwise, as shooting, wrestling, and hurling with a ball; whereunto they are so inured, that for their activity in that manly exercise, these western men excel all others in the realm." The reputation thus alluded to by the historian survives to the present day.

Closely allied with his passionate ardour for physical recreation, young Gale possessed an extremely sensitive disposition, full of kindness and rare tenderness of feeling, which exhibited itself in many apparently trivial incidents of childhood. For instance, on one occasion he found himself in the possession of a bird's nest, which had been discovered by him in a

hedge, as he was returning from school. Very proud was James of his new acquisition. No miser ever hugged his bags of gold more closely to his heart, than did the lad his little mossy nest. Suddenly a cloud passed over the bright sunshine of his boyish enjoyment; he remembered that he had been carefully admonished by his parents to hasten straight home immediately after leaving school, but, unluckily, the parental injunction had been forgotten during the excitement of the search for the nest, the whereabouts of which had become revealed to him while unintentionally overhearing a conversation between some of his school-fellows, who intended robbing it of the young birds. It was raining heavily, he had proceeded more than a mile from the place whence he had taken the nest, and would soon arrive at his parents' door, where a severe chastisement inevitably awaited him for loitering in the rain and allowing himself to become wet to the skin. Not a very inviting prospect for him, by any means. Yet, at this very moment, a strong conflict of feeling arose in his breast. He had preserved the poor and helpless fledglings from their schoolboy persecutors, but had he not himself acted most cruelly in taking them from the tender care of the parent-birds, who, at that very moment, perhaps, were sadly mourning their bereavement! He felt something of that kindly feeling which once led the gentle-hearted

Cowper eloquently to describe how the meanest things that breathe are all—

“As free to live and to enjoy that life,
As God was free to form them at the first,
Who in his sovereign mercy made them all.”

But what was Gale to do? “If I return and place the nest in the place from whence I took it,”—reasoned he—“it will be so late before I reach home, that there will be no possibility of my escaping a severe chastisement.” Yet, on the other hand, there was the case of the young birds. “Suppose that *I* had been taken in like manner from *my* parents,” thought James, “how bitterly *they* would mourn; and in like manner, how deeply the poor birds who have been thus robbed by me, must lament the loss of their unfledged offspring.” The struggle between the fear of punishment, on the one side, and of compassion for the birds, on the other, did not last many moments. With characteristic promptitude, he at once retraced his steps, and placed the nest in its original position, at the same time taking minutest care that it should appear as if it had never been disturbed. This done, he looked thoughtfully around him, and observed the parent birds fluttering uneasily among the leafy branches of a spreading tree situated on the opposite side of the roadway. In tones of melting earnestness, he, with childlike simplicity, implored them to return to their young ones, and as if they understood what

he was saying to them, promised, if they would but come back to the nest, he would bring them food every day until the little ones were able to fly and obtain their own nutriment. Very simple are these details, but it is from such glimpses of child-character that we obtain a real clue to the true spirit of the man ; and as such they must always possess a greater or lesser degree of interest. The happiness experienced by young Gale in being able to repair the mischief thoughtlessly effected through his instrumentality, more than compensated him for the punishment procured by his delay in returning home.

We generally find extreme gentleness of disposition united to the possession of real bravery, and James Gale, during his boyhood, proved no exception to the rule. On one occasion, while playing with a youthful companion opposite Folly House, a favourite place of resort at Tavistock, near the Abbott's Bridge, by which the Tavy is here crossed, his playmate accidentally fell into the stream, at the same time uttering a piercing cry. Without a moment's hesitation, young Gale plunged into the treacherous water, and catching hold of the sinking lad, brought him safely to the shore. The poor fellow, nearly dead from the sudden shock experienced by him, and shivering from the effects of his involuntary immersion, and having also severely bruised his knee, found himself too weak and fatigued to walk home.

Young Gale was, however, fully equal to the emergency. Courageously taking the fainting boy on his back, he uncomplainingly carried him home. The distance was upwards of half a mile, but the heroic lad thought little of the weight of his burthen. He had saved his comrade's life: *that* was sufficient for him. When the mother of the half-drowned lad had overcome the suddenness of the fright, occasioned by the unexpected apparition of James and his pale-faced trembling load, it occurred to her that the boy who had so bravely assisted in preserving her son from a watery grave, was deserving of some pecuniary reward. Accordingly the good lady, who, by-the-bye, was the wife of one of the most respectable tradesmen in the town, speedily ransacked her pockets, and presented her son's gallant deliverer with the munificent sum of *one halfpenny* ! That coin, insignificant as it was, remained in Gale's possession during many subsequent years, being carefully treasured by him, both as a memento of an eventful occasion, and as a reminder of the profuse generosity of the kind and liberal-hearted donor.

The daring action just described was not the only one of its kind related of young Gale. On a previous occasion he had also been the means of saving a life imperilled in the river. He was passing through a locality known as "The Meadows," generously provided by the Duke of Bedford as a place of

recreation for the inhabitants of Tavistock, having a broad and picturesque walk leading along the river Tavy, and richly studded with fine, leafy trees, when he observed a youth quietly bathing in a portion of the stream known as St. Mary's Pool. This tempted him to bathe also, and after enjoying for some little time the pleasant coolness of the water, he commenced dressing himself in a retired place on the river's bank. He had scarcely begun putting on his clothing, when, happening to cast his eyes towards the other lad, he, to his great alarm, perceived him to have floated out of his depth and unable to reach the shore. The terrible look of horror and despair which the unfortunate lad's features had assumed nerved Gale to the heroic task of rescue. Twice had the poor fellow disappeared beneath the glassy surface of the stream, and even as Gale, for the moment paralyzed with the suddenness of the unexpected spectacle, gazed bewilderingly at him, he, with a heart-rending cry, sank for the third time. With Gale, to think was to act. As the wretched lad disappeared from view, James darted forward, dived boldly into the river, and the next moment had seized the trembling form of the despairing boy, who was scarcely aware that the hand of deliverance had arrived. The frantic struggles of the poor fellow well-nigh led to the death of himself and his youthful preserver, but, after a final desperate effort, young Gale was

enabled to bear safely his almost inanimate burden to land, which was no sooner reached, than he commenced vigorously rubbing the lad's hands and chest, for the purpose of restoring the ebbing sensibility. While thus charitably performing the part of the Good Samaritan, Gale, to his no small astonishment, suddenly received on his back a heavy blow with a thick stick; his tingling ears at the same time being saluted with the not very complimentary words:—"If you had'nt been here, my boy had not been bathing."

The speaker proved to be the father of the lad so courageously rescued by our young hero. Smarting severely from the effects of the but too well directed blow received by him, and still more so from the keen sense of injustice occasioned by the unfounded accusation levelled against him, Gale, forgetful of the disparity of age and strength existing between himself and his opponent, attempted to retaliate, but was speedily checked by a second edition of the heavy punishment which had so effectually aroused his ire. This was too much. Rushing into the water, he swam from reach of the irate parent's stick, and then, hastily turning round, began indignantly remonstrating against the unjustifiable treatment to which he had been so unexpectedly subjected. In the meantime, the lad whom he had rescued, having somewhat recovered, began explaining to his father

the true state of the case, and at last convinced him of the untoward mistake committed by him. It was not the first time that a good action on the part of Gale had met with an ill reward, but it in no-wise checked the generous impulses of the young hero, whose gallant conduct certainly merited something better than the thrashing he received for his pains. If ever a youth deserved the Royal Humane Society's Medal, that lad was James Gale.

Our hero's boyish fearlessness and daring spirit would sometimes be exhibited in another and totally different direction. For instance, one clear moonlight evening, he found himself in company with two lads about his own age, at the entrance to the dissenters' cemetery, prettily situated on the bank of the Tavy, between Vigo and the Abbey Bridge. "It occupies the site of a beautiful field, once the scene of many a bull fight and wrestling match. By excavating a lower portion of the hill, which rises precipitously, clothed with plantations above, a tolerably large piece of ground has been acquired, which has been laid out in walks and grass plots as a garden; a raised bed of flowering shrubs in the centre adds to the pleasing illusion."*

The entrance to the cemetery had, by accident or design, been left unlocked, and this being discovered

* *Home Scenes, or Tavistock and its Vicinity, by Rachel Evans.*

by the youthful trio, they, animated by a species of fascination for which they could not account, stood for some minutes gazing silently through the open gateway, on the various tombs whose forms appeared, in the pale moonlight, like so many cold and shrouded spectres, rising in grim silence from the yawning graves before them. Half terrified at their boldness, yet loth to exhibit any symptoms of fear, Gale's companions began conversing, in hushed whispers, of those whom they had known in life, but whose mortal remains now lay interred beneath the soft grassy turf of the cemetery. Their chief talk, however, related to a vault which had recently been opened for an interment, intended to take place on the following day. Young Gale wished his companions to enter the cemetery with him for the purpose of stealing a peep at the entrance to this vault, but the project was too terrifying for them, and they resolutely refused compliance with his rash desire. On this, James scornfully avowed his intention to enter the cemetery by himself, descend into the chamber of death, and touch one of the coffins resting on the shelves. There are not perhaps, many grown up persons who, at such a time, and under such circumstances, would have found themselves possessed of courage sufficient to carry out such an extraordinary resolution; and therefore it is not surprising that Gale's young

companions endeavoured to dissuade him from his intention. They were seriously alarmed, and had become wrought up to that intense pitch of nervous excitement, when—

“Echoes, the very leavings of a voice,
Grow babbling ghosts.”

Young Gale, however, firmly declined receding. Opening the gate of the cemetery, he steadily entered the wilderness of tombs and graves, and fearlessly approached the dreaded receptacle of decaying mortality. Without exhibiting the least hesitation, he passed its gloomy portals, and, to the horror of his comrades, instantly disappeared from view. On reaching the bottom of the cold, damp steps, leading to the interior of the dismal structure, he stretched forth his hands for the purpose of touching one of the coffins which lay before him. As he did so, he fancied he heard a sound as of something falling. What could it be? Something had actually fallen from the shelf on which reposed the coffin he was about to touch. For once his courage appeared on the point of deserting him, but for an instant only. The next moment he felt himself courageous enough to face without flinching the ghastly spectre which he imagined to be standing behind him, frowning and terrible, ready to punish, with his long, thin bony fingers, the youthful dis-

turber of the tomb's sacred repose ; but no spectral form could the straining eyes of young Gale behold, as, with half defiant, half curious gaze, he attempted to peer through the pitch-like darkness which shrouded the farther recesses of the gloomy vault. After waiting a few moments, he slowly ascended the steps leading from the tomb, and as he emerged into the fresh evening air, the neighbouring chimes rang forth the hour of nine. Scarcely had he made his appearance on the pathway leading from the vault to the gate of the cemetery, when the two lads who were tremblingly awaiting his return, instinctively uttered a loud cry of alarm. In their fear, they knew not whether it was actually he or his ghost, for, during his journey into the gaping charnel-house, his clothes had become covered with dust and whitewash, which imparted to him, as he stood among the tombs in the spectral moonlight, a rather unearthly aspect. The sound of his voice, however, reassured the frightened boys, who were by no means loth to hurry as fast as they could from the scene of the adventurous nocturnal incident.

Such proofs of boyish fearlessness as these naturally tended to gain for James considerable reputation amongst his numerous playfellows, some of whom regarded him as a kind of boy hero, but, after all, Gale's love of fun was more to their taste, and they would most readily join with him in carrying into effect, the

many practical jokes devised by him for their amusement. Some of these were not a little ingenious, and worth narrating. On a market day, towards dark, for instance, Gale and some of his roguish companions would proceed a little way out of town until they arrived at a place suitable for commencing operations. Here they would then tie some rubbish up in brown paper, so as to make a small and neat-looking parcel, which was then placed on the footpath, one end of a long piece of string being attached to it. The other end of the string was held by the mischievous urchins, who were concealed behind a hedge on the opposite side of the road, where a thick branch, or bush, of hawthorn or some other tree, would be prepared and surmounted with several heads of the *hake*, or *hakoh*, a well known species of fish, which heads generally presented a curious phosphorescent appearance when placed in a dark place. As the intended victim, perhaps an unsophisticated old country dame, perceived the parcel and stooped for the purpose of picking it up, it would dart forward for the distance of a couple of feet or so, and then remain motionless. On again attempting to pick it up, the seemingly animated parcel would again leap onwards in a most unaccountable manner. While thus busily engaged in pursuit of the mysterious package, the luckless dupe would be suddenly startled by a loud and apparently most unearthly noise. Glancing in the

direction from whence the mysterious sounds proceeded, her eyes would be saluted by the terrifying spectacle of a number of strange heads, emitting a phosphorescent light, glaring horribly upon her. This was enough. One glance at the supposed supernatural object, and away would the affrighted old lady scamper, firmly convinced in her own mind, that there was something of witchcraft in the matter; that the legend of the Devonshire pixies was not altogether a myth, as modern philosophers would have us believe. Sometimes these appearances were heightened by the judicious use of a little red or blue fire.

Other practical jokes devised by Gale were of a less startling, although certainly of a mischievous character. Among other things, he would sometimes go out in the evening, with a fish-seller's hand-cart, accompanied by a confederate. Proceeding to the summit of a steep ascent, he began shouting out, at the top of his voice, that he had fine fresh fish for sale. He generally preferred pilchards, these always being favourite fish with the Devonshire folk. These he would announce for sale at half the ordinary price. The deluded cottagers, anxious to secure the piscatorial dainties at so cheap a rate, would rush eagerly, with pans and dishes in their hands, from their abodes, but only to see the fisherman's cart proceeding at a rapid rate through the misty distance. In vain did they shout after him

and bid him to stop. As fast as they got into one street, he had vanished into another. The *ruse* seldom failed to create its dupes, to the no small mirth of those initiated into the secret.

At other times, Gale would steal slyly into the passage of a house where the inmates were comfortably gathered together around the parlour fire. Here he would place the long, fine nozzle of a peculiarly shaped syringe through the keyhole, and noiselessly discharge an almost imperceptible stream of water on the pictures, looking glass, and other ornaments of the mantle-piece, which soon became covered with moisture, to the great bewilderment of the astonished observers, who were generally at a loss to account for the strange phenomenon, the author of the same having by this time disappeared as quietly as he came.

One or two more instances, and then these anecdotes of boyish frolic must terminate. Selecting for his base of operations a narrow lane in Tavistock, young Gale would craftily enter a house in which the rooms were let out to different tenants, and ascending to the first floor, where there were a couple of doors facing each other and opening inwardly, would tie the handles of the opposite doors, tightly together by means of a piece of stout cord, so that those in the different rooms would be unable to open them. Then, after disguising himself in the clothes of one of his

companions, or, by means of a jacket stuffed up the back of his coat, assuming an appearance of bodily deformity, he would stand at the bottom of the staircase and shout out lustily the names of the good people whose doors he had so mischievously fastened together. On hearing their names called thus loudly, they naturally rushed to their respective doors, and impatiently endeavoured to open them. The doors, however, obstinately refused to yield. Then some such dialogue as the following would take place between the neighbours, now connected by ties other than those of friendship.

"Sarah Jane, what's the matter with my door? Don't you hear that I'm wanted?"

"Why, my dear soul, I'm wanted too, but surely our doors must be bewitched."

At this juncture, there would be a loud call from below, bidding them delay no longer, but at once hurry down stairs. "What is it?" they would both shout with one voice, again vigorously renewing their attempts on the obstinate door.

"Something very particular the matter," was the prompt reply, delivered in most imperious tones.

This would work both the now irate ladies up to an intense pitch of excitement. They would bang, pull, push, and kick at the refractory doors, at the same time shouting, expostulating, reproaching, and screaming, at the top of their voices, until the

neighbours, thinking murder, or something equally serious, was going on, would hastily rush up, and discover the nature of the mischievous trick played on the naturally exasperated victims, who would vow bodily revenge on their unknown tormentors.

Had young Gale inherited the mischievous propensities of a Grimaldi, he could not have devised a greater variety of frolicsome pranks than those with which he by turns diverted or annoyed his neighbours, who must have deemed him veritably possessed by some elvish sprite, such a one as Robin Goodfellow, of whom Shakespeare, in his "Midsummer's Night's Dream," affords us such a lively and amusing picture. With Gale, door knockers were favourite instruments for practical joking. Taking advantage of a dark night, with the aid of a companion, he would adroitly affix the end of a long piece of string to this prominent ornament of a door belonging to a house situated opposite the residence of one of his companions. The other end of the string would be fastened to a small stone lying in the road. Then ascending to the top storey of his confederate's residence, Gale would noiselessly let down a second piece of string, which was fastened by him to the first piece, in such a manner that it could be detached in an instant. All being ready, he would commence pulling the string gently. This would produce a series of gentle knocks, which rapidly increased in

number and intensity, until the startled inmates becoming alarmed, rushed frantically to the door. The string attached to the knocker was sufficient to show them how they had been hoaxed, but not to enable them to discover the grinning perpetrators concealed in the opposite house. Small crackers, to which were attached slow fusees, were sometimes affixed by Gale to knockers of doors in the vicinity of his residence, occasionally to the great consternation of timid individuals who, when about to give a gentle rap at their respective doors, to their great consternation unexpectedly found themselves saluted, and the inmates startled, with a succession of tremendous "bangs!"

With some, these boyish escapades of young Gale procured for him the reputation of being a hopeless "ne'er-do-well," but those who knew him intimately were fully aware that underlying this spirit of fun and frolic, there was to be found an inexhaustible sub-stratum of inflexible integrity and firm love of justice, virtues which were sometimes carried by him to a point, which, to those ignorant of the various peculiarities of his character, must have strongly resembled the vice of obstinacy. For instance, hurrying one day to school, he accidentally ran against a gentleman, who, greatly annoyed at the supposed carelessness of the lad, administered him a sound box on the ears, and then demanded his name, address, the

name of his school, also that of his master. These were given in a short straightforward manner, implying that young Gale was by no means to be intimidated by the threats of the gentleman to make complaint to his supposed aggressor's parents and schoolmaster. If, indeed, the gentleman had entertained any doubts on this point, they were speedily set at rest by his suddenly receiving a well-directed blow from an old cabbage stump, thrown in retaliation by young Gale, who, on perceiving the success of his missile, instantly took to his heels, arriving at school none the earlier for the involuntary delay. He had scarcely taken his seat, when there came a loud knock, and, the door being opened by Gale himself, in walked the gentleman whom he had so uncereemoniously assaulted. Confronting the visitor, who was taken somewhat aback by his youthful adversary's composure, he calmly told him that the schoolmaster was in, and if he, the gentleman chose, he could have an opportunity of speaking to him. Of course the irate new-comer was not long in acquainting the schoolmaster, a pedagogue of the old school, with the gross and unwarrantable behaviour of his pupil. Gale was speedily, but not unexpectedly, summoned and peremptorily commanded to beg the gentleman's pardon. Obstinate refusing to comply with the mandate, he received a severe caning, and was ordered to the class-room,

there to await further punishment. At this unpromising stage of the affair, Mr. R., a local magistrate and father of a very popular writer, entered the room. He was a person for whom the young culprit entertained considerable respect, and on hearing the charge against Gale, for whom he possessed some liking, he appeared much pained by his seeming obstinacy. Availing himself of the influence possessed by him over the mind of the youth, he repeatedly urged him to beseech the gentleman's forgiveness. Gale, in surprise, replied, "Would you have me beg pardon? To beg pardon is to be sorry for what one has done, but I am not sorry, therefore it would be an untruth." "Besides,"—he argued, "as my running against the gentleman was perfectly unintentional, it was his (the gentleman's) place to beg forgiveness for the box on the ears which he gave me." Astonished and somewhat perplexed by the lad's notions of ethics, Mr. R. made some further enquiries into the matter, the result being an explanation which placed the affair in a light somewhat more favourable than previously to Gale. He perceived that no insult had been intended by the latter, and that the matter was purely accidental in its origin. Exonerating him, therefore, from the accusation of being actuated by malicious motives, he, at the same time, seized the opportunity to remonstrate in kindly language with the impetuous youth, and point out to him that he

(Gale) had been prompted evidently by a most unchristian spirit of retaliation, and ought, therefore, to be sorry for the hasty manner in which he had acted. Gale, in reply, acknowledged it was not right to return evil for evil, but stoutly protested that he could not feel sorry for what he had done, and, consequently, would not offer an apology. Almost vanquished by the obduracy of the lad, strong in its curious combination of firmness, and logic, Mr. R. abandoned, as hopeless, the idea of extorting an apology.

On another occasion, while playing with a number of companions at the boyish pastime of "fox-hunting," Gale found himself enacting the part of "fox," and as such, hunted by his playmates, who represented the hunters. In the course of the chase he happened to take refuge in an orchard belonging to a farmer, possessing a most tyrannical temper, and who had always evinced a great dislike to boys playing about. Of course Gale was wrong in committing a trespass, but the excitement of the moment occasioned him to forget the impropriety of his conduct. It being spring time, there were of course, no apples on the trees, but the farmer, perceiving Gale crouching in the orchard, as if to evade notice, at once concluded that the youthful trespasser was present for no good purpose. Suddenly darting forth and seizing the lad with a powerful grasp, he tied him to a large

agricultural machine, at the same time ordering him to plead for his (the farmer's) forgiveness. Gale, however, was obstinate. Finding the threats futile, and thinking to terrify his captive into compliance, the farmer placed Gale in the hands of a constable, who happened to be passing at the time, and who bore Gale a grudge, and directed him to march the alleged culprit forthwith to the lock-up. Conscious that he had not wilfully perpetrated any wrong, and knowing moreover, that he had not damaged any of the farmer's property, Gale at once declared his willingness to accompany the policeman. During the journey to the lock-up, the farmer repeatedly urged Gale to express contrition for the trespass of which he had been guilty, but was met each time with a point-blank refusal. By this time a crowd of people had collected, and the farmer, conscious of his unenviable reputation, and becoming apprehensive that his conduct towards Gale would not be construed in a very favourable light, directed the prisoner to be released, at the same time warning him of the punishment he might expect if again caught trespassing in the orchard. Gale coolly turning round to the farmer, told him he was afraid that he (the farmer) had lost much valuable time, at the same time pointing out that his presence in the orchard could not have been dictated by any evil intent, there being, as yet, no fruit upon the

trees. He also ironically expressed sorrow for his involuntary act of trespass, and mockingly proffered to accompany the farmer part of his way home, an offer, it need scarcely be observed, which was not accepted.

This obstinacy of Gale arose in a great measure from his strong inherent courage. Many a time the utterance of a falsehood on his part might have saved him from the chastisement incurred by him from the repetition of his practical jokes, but he scorned having recourse to such a subterfuge. With Southerne, he may be said to have held the doctrine that :—

“ Lying’s a certain mark of cowardice ;
And, when the tongue forgets its honesty,
The heart and hand may drop their functions too,
And nothing worthy be resolved and done.”

We are not seeking to defend or in any way extenuate Gale’s youthful short-comings. Our simple object is to furnish a faithful portrait of the boy, that we may the more fully comprehend the character of the man, and the modifying influence exercised upon it by the chastening hand of affliction. Young Gale was just the kind of lad who would have attached himself to the heart of Dr. Arnold, had he been permitted to have become one of that famed Rugbian teacher’s pupils. At Rugby he would have been in his real element, dividing

his time between the physical and the intellectual; for a love of learning, a deep and unquenchable thirst for knowledge, ever characterised Gale's career, even while yet a boy. It was curious, but not the less true, that the wild and thoughtless lad who so often amused himself by madly running along the narrow ledge of the lofty bridge leading across the river Tavy, and thereby exciting the fears of the timid, who every moment expected to see him suddenly miss his footing and become hopelessly precipitated into the stream flowing rapidly below, could be the grave and studious youth, who was at times to be found eagerly poring into such scientific works as might fall in his way, or silently gazing up toward the starry heavens, as though, child as he was, he would fain penetrate the solemn mysteries which:—

“Eye hath not seen, ear hath not heard.”

Yet so it was, and with the account of his student life, we shall open a fresh and more auspicious page in the history of James Gale.

CHAPTER III.

“How would he wander round the woods, the plains,
When every flower from nature's wreath had fled;
Tracing the shower-bedimpled sandy lanes,
And winding fountains to their infant bed,
With many a flag and rushy bunch bespread;
Making each curdle boil and boil away,
And bubbles guggling born, that swell'd and fled
Like changing scenes in life's ephemean-day.”

Clare.

“The neighbours star'd and sigh'd, yet blest the lad;
Some deem'd him wondrous wise, and some believ'd him mad.”

Beattie.

THE STUDENT.

THE various features of human character are, it has been aptly remarked, “like those of a landscape, which imperceptibly vary with the progress of day, and as light or shadows are reflected on the scene.” We are frequently reminded of this as we study the life of James Gale. In his now almost forgotten poem of the “Minstrel,” Beattie has presented us with a portrait in many respects similar to that

furnished by the leading characteristics of our youthful hero. Like the Poet's Edwin, young Gale oft :—

—“to the forest sped,
Or roam'd at large the lonely mountain's head,
Or, where the maze of some bewilder'd stream
To deep untrodden groves his footsteps led,
There would he wander wild.”

Of Gale also, as of Edwin, it might be said that :—

“In truth he was a strange and wayward wight,
Fond of each gentle, and each dreadful scene,
* * * * *
Even sad vicissitude amus'd his soul ;
And if a sigh would sometimes intervene,
And down his cheek a tear of pity roll,
A sigh, a tear so sweet, he wish'd not to control.”

The finer and the ruder elements of our nature are sometimes strangely blended together. The thoughtful youth who oft sought mental recreation amid the solitudes of nature, possessed little in common with the young mad-cap whose wild and mischievous pranks amused or annoyed, as the case might be, those who became his victims. In his own person Gale appeared to unite most diverse qualities. His impetuous and apparently unyielding temper concealed a nature full of affection and exquisite sensibility. The boy whose stubbornness oft defied the power of chastisement to shake, would go out of his way rather

than trample on an unoffending worm. It is impossible to estimate Gale's character by glancing at any single quality possessed by him. The various traits and features of character must be studied as a whole, not separately, otherwise we are apt to form erroneous conclusions, and perpetuate false and mischievous impressions. We have described the lighter side of Gale's boyish nature: we will now have a look at its graver and more studious aspect.

Books and pictures were the treasures most prized by James during his childhood. To his young mind these possessed far greater attractions than were owned by any of the numerous inducements to fun and frolic which perpetually came before him. Many and many a time, when his parents deemed him to be at play with his youthful companions, he was quietly amusing himself with some picture book, perhaps a copy of Bunyan's "Pilgrim's Progress," or a stray volume of the "Saturday Magazine," which he had borrowed from an obliging neighbour. Books in those days were not so cheap or so plentiful as they are at present. The stamp and paper duties were still unrepealed, and penny newspapers seemed an improbability, if not an impossibility. Those were the days of sixpenny Fortune-Telling Guides, Prophetical Almanacks, and choice effusions from Fairburn's renowned establishment near Tower Hill, London. From the same place also were mainly procured the large

gaudily coloured pictorial sheets, known as "Christmas Pieces," with their great blank spaces, intended in due time to be covered with startling flourishes and other specimens of caligraphic skill on the part of school-boys desirous of gaining a few pence by the exhibition of these elaborate specimens of penmanship. As might have been anticipated, the generality of books prepared for the use of children were, at that period, of the most trashy kind. Their illustrations frequently violated every principle of pictorial art. The drawing was bad; the colouring atrocious. It was not then, as at present, generally recognised that good pictures are fully as necessary to the proper intellectual education of a child, as is good literature. The children's books published now-a-days by Warne, Routledge, and other booksellers, afford a strange contrast, in their boldness of style and beauty of illustration, to the miserably got up nursery tales and fairy legends with which the present generation had to be content in its earlier days. Yet, in the absence of more attractive and useful works, the productions of the famous Minories dépôt commanded a large and remunerative sale, equalled by that of the once well-known theatrical prints for juvenile use, issued from the same place, or from the rival shop of Skelt.

In most country towns the supply of children's books was usually restricted to one, or more rarely, two establishments, the proprietors of which also

dealt in confectionery, toys, and other objects of childish ambition. The cheap bookshop, with its stock of penny periodicals, is an entirely modern institution. Tavistock, at the time to which we are alluding, contained one of the old fashioned description of shops, where books, tops, dolls, buns, and such like articles, continually divided the attraction of its numerous juvenile patrons. To young Gale, the place seemed a very palace of joy and delight. He hovered about the sun-bleached door way, flattened his nose against the dusty window panes, and vainly longed for wealth sufficient to enable him to purchase the whole stock of juvenile book-lore which the shop contained. The picture story-books in the ever attractive window seemed continually crying to him "come and buy us, come and buy us !" but children in general are not able to purchase shilling and sixpenny books, at pleasure, and so Gale, not having the cap of Fortunatus, was often compelled to forego the intense pleasure which the possession of a few such books would undoubtedly have afforded him. However, it is a well known axiom, that "where there's a will, there's a way," and so reasoned James. During his visits to the toy shop, with the view of purchasing marbles and other boyish essentials, he had frequently loitered therein for the purpose of leisurely gazing on the—to him—exciting pictures contained in the little story-books, which lay temptingly open on the shop counter ; but, bold as he

was, he dared not touch them, be it ever so lightly, much less attempt to turn over the leaves; for the rigid expression of the shop-mistress's features declared, as plainly as looks possibly could do so, that her inflexible rule with respect to all articles offered for sale in her establishment, was, "eyes on, hands off." All Gale's boyish hardihood proved insufficient to induce him to venture upon braving the displeasure of the presiding goddess of the Minervian temple. He instinctively felt that a temporary triumph would be dearly purchased at the cost of perpetual exclusion from the neighbourhood of the tempting counter, especially if accompanied by the loss of all future opportunities of penetrating the mysteries of its literary and pictorial arcana. His ingenuity at last suggested to him a plan, which fairly merited the success which subsequently attended its adoption. Whenever he found himself in possession of a penny he would march boldly into the shop and purchase a bun, during the eating of which he—miser like—feasted his eyes to his heart's content, with the rich intellectual food afforded by the open books on the counter; but, as these always remained provokingly open at the same pages, his mental appetite became somewhat sated, and he longed for novelty. At last, one day, when, as usual, he had purchased a bun, the shop-mistress observed him glancing somewhat hesitatingly at her. Enquiring whether he wanted any-

thing further from her, she was met with the strange request—very timidly uttered—that she would kindly turn over the leaf of one of the books lying open before him. Gale's desire was good-humouredly complied with, and thenceforward every purchase of a bun was coupled with an appeal, rarely unsuccessfully made, to "turn over a fresh leaf, please." This was purchasing mental recreation at a cheap rate.

Tavistock was one of the first to boast its possession of a British school. This educational institution was maintained principally by means of charitable subscriptions, and the master was permitted to eke out his income by the formation of a select class of pupils desiring instruction of a higher kind than that usually afforded in the regular school classes. Young Gale became a pupil in this class, but his progress was by no means encouraging to those believing in juvenile precocity. By some of these he was set down as one who could never learn. It was not the first time that a boy's capabilities had been misconstrued. In his earlier years, Chatterton was deemed a stupid and incapable lad by those who failed to detect the thoughtful and studious bent of his mind. And it is a well known fact, that many interesting displays of understanding and disposition, exhibited by childhood, are entirely lost for want of enlightened discrimination on the part of observers. Those who censured young Gale the most, understood him the least. To

them he invariably appeared slow in learning his lessons. Others younger than himself, would sometimes overtake him in his class, while he ignominiously lagged behind. Yet he was by no means really backward in acquiring knowledge. Everything learnt by him was thoroughly mastered and stored in his mind. He might be slow, but he was also sure. His memory too, was very good. Everything, no matter how trivial, learnt by him could always be remembered without the slightest difficulty, although months, and even years, might have elapsed. Long after he had attained the age of manhood, he often amused his friends by the display of curious feats of memory, including among other things, the repetition of the entire contents of the now antiquated spelling book used in the school attended by him when a child. At the time Gale was emerging from boyhood, Mr. Charles Knight and the Messrs. Chambers were busily engaged in familiarising the people with good and cheap literature, thereby stimulating, to an almost inconceivable extent, the popular thirst for knowledge. "The Penny Magazine," the "Saturday Magazine," and "Chambers' Journal," possessed irresistible attractions for young Gale, especially the more scientific articles contained in those well-known publications; for Gale's tastes, at a very early age, possessed a scientific tendency, leading him,

while yet a youth, into attempting chemical experiments not always of a harmless character.

It is related of him that on one occasion, his parents being from home, he began experimenting with a large empty pickle-bottle which had fallen into his possession. Boring a hole in the cork, he inserted therein one end of the stem of a long clay tobacco pipe. He then poured some water into the bottle, in which he had also placed a few pieces of zinc, afterwards adding some sulphuric acid, or oil of vitriol. For the information of those who may not be initiated in the simple mysteries of elementary chemistry, we may mention that oil of vitriol, or hydrated sulphuric acid, is a dense colourless oily fluid, which boils at a moderate temperature and distils over unaltered. It has a great affinity for water, its combination with which is attended with the production of great heat. When four parts of the acid are poured *into* one part of the water—not the *reverse*, as it is sometimes dangerous to pour water into the acid—the temperature rises to 300 Fahrenheit, and the heat is liable to crack any glass vessel in which it may be placed.* The acid is also procurable in a solidified state. In this form it consists of a white crystalline mass, resembling asbestos in appearance, which can be moulded with

* *First Lines in Chemistry.*

perfect safety in the fingers, as if it were simply wax. It is a most important substance, forming as it does the starting point of most important chemical manufactures; the celebrated Liebig even going so far as to assert "that the amount of sulphuric acid made in a country is a sure index of its wealth and prosperity." But we are digressing, and must return to young Gale and his experiments. Placing the cork in the bottle, a considerable quantity of gas was evolved, and the bottle rapidly became heated. Gale placed a light to the end of the pipe stem, and the gas becoming ignited burned with great brilliancy. After a little time, our young chemist removed the pipe from the cork, and firmly sealed the mouth of the bottle. Taking up the bottle, the gas generated within caused it to shiver to pieces instantaneously. Fortunately, however, James escaped injury.

On another occasion, while playing with some chemical compound, it became ignited, and a small quantity was blown into Gale's mouth. His grandmother, hearing the noise, rushed into the room, and, perceiving smoke issuing from the mouth of the youthful experimentalist, at once concluded that he must have set himself on fire internally. Dashing him to the ground, she drenched him so plentifully with water, that he became well-nigh exhausted. It was dangerous to leave chemicals within his reach, for the moment that one's back was turned, he would

begin experimentalizing, regardless of danger to himself.

When his youthful taste for scientific knowledge was debarred from due exercise, Gale would amuse himself by becoming story-teller in general to his youthful companions, and when books from which to read interesting narratives were not at hand, he would invent legends and tales of chivalry, largely interspersed with brave and youthful warriors, tyrannical barons, lovely and persecuted young ladies, frowning castles, grim servitors, spectres, ghosts, and the common paraphernalia of the romances then in fashion; for at that time Charles Dickens had not long founded the modern school of fiction, and the "Castle of Otranto," and other novels of a like character, found plenty of readers. Those were the days of penny romances, rejoicing in the high-sounding names of "Varney the Vampire, or the Feast of Blood," "The Death Grasp, or the Skeleton Hand," "Vileroy, or the Horrors of Zindorf Castle," "Ada the Betrayed," and so forth; which novels seldom lacked the patronage of sentimentally-inclined milliners' apprentices, or enthusiastic school-boys just entering on the real voyage of life.

As Gale became older, the studious tendency of his character became more and more observable. His favourite books were Dick's "Material Universe," Chambers's "Information for the People," Knight's

“Shilling Volumes,” and works of a similar character; his lighter reading being supplied by the novels of Marryatt, Ainsworth, Bulwer, Mrs. Bray, and other popular writers of fiction. Often was he to be found idly wandering, book in hand, along the pleasant paths which abound in the vicinity of Tavistock, but his favourite resort was an ancient oak tree, known as “Lady Howard’s Tree,” situated in the “Meadows” outside the town. There he would sit in the cool shade of the leafy branches, and mentally devour, with avidity, the instructive contents of the volume chosen by him as the silent companion of his studious hours. He was somewhat slow, as at school, in mastering the framework and details of any important book; his habitual practice being to read for about fifteen minutes, and then to devote twenty or more to the study of what he had been reading. This characteristic habit has, to this day, survived the terrible affliction which at one blow deprived him of the blessings of sight; the amanuensis, to whom is delegated the onerous task of reading aloud to Gale, being frequently interrupted and bidden to pause a few minutes from his labour, for the purpose of allowing his sightless listener an opportunity of cogitating on what he has heard read to him.

These boyish days formed a pleasant episode in Gale’s life. Passionately fond of Nature and her

countless beauties, he would at times ramble for hours amid the charming scenery which encircles the town of Tavistock. Buckland Abbey, the birthplace of Sir Francis Drake; the picturesque banks of the winding Tavy; Kilworthy, formerly the seat of the Glanvilles; Parkwood Vale; magnificent Whitechurch Down, and scores of other localities, of more or less interest or local renown, wooed by turns his youthful attention. But as he dreamily gazed upon the rich swelling meadows, tall majestic tors, romantic waterfalls, fertile valleys, sombre glens, heath-covered slopes, gentle woodlands, and all the thousand and one natural attractions which lend such a charm to the scenery of Devonshire, he knew not that the fatal hour was speedily approaching when the glorious spectacle, the soul-elevating prospect, would become blotted from his straining and sightless eyes, to be eagerly retained with jealous care within the silent chambers of his memory. Even so. In the long and solemn after-years, when the hand of affliction lay heavy on the soul of James Gale, often would he mentally picture to himself the well-remembered landscapes of his beloved county. In imagination, again he would tread with boyish ardour the dark and awe-inspiring recesses of Dartmoor, watch the purple violets modestly peeping forth from their leafy places of concealment, gaze on the glorious aspect of the heavens, whose passing clouds

reflected, as in a prism, the countless tints of land and sea, or marked the gay-coloured insects fluttering in the bright sunshine, which sparkled alike on mead and brook.

The studious tastes of Gale were of great service in mitigating the force of the affliction which, as we have before hinted, subsequently befel him. He was gradually acquiring the art of self-reliance, of trusting for success more to the results of his own efforts than of those made by others. This is the truest kind of help. With it, a man can do almost anything; without it, he is helpless. We have already alluded to the facilities which the increasing abundance of wholesome cheap literature afforded Gale. Over and over again has he expressed his deep sense of the numerous obligations he has been under to Mr. Charles Knight and other worthy labourers in the cause of sound popular literature. But his case is only one of thousands. The nation owes much to Mr. Knight. No man has done so much, certainly no man has done more, than the projector of the "Penny Magazine," the "Penny Cyclopædia," and other now historical works, in developing that remarkable and encouraging degree of intelligence and information at present existing amongst large portions of our labouring classes, and which has more than once protected the kingdom from the dangers of political convulsion, and which also

affords the surest possible guarantee of a brighter social future for those whose lot has so long been frequently one of hardship and toil.

CHAPTER IV.

“ Oh God, I am blind ! blind ! blind ! ”

Kingsley's “ Westward Ho ! ”

“ Repine not, O my son !

In wisdom and in mercy Heaven inflicts,

Like a wise leech, its painful remedies.”

Southey.

FROM LIGHT INTO DARKNESS.

WHEN he had arrived at the age of twelve or fourteen, James Gale began to experience the first indications of the sad calamity which was destined to deprive him, ere he had crossed the threshold of manhood, of the numerous enjoyments and exquisite pleasures afforded by means of that wonderful organ, which, in the words of Young—

“ Takes in at once the landscape of the world

At a small inlet which a grain might close;

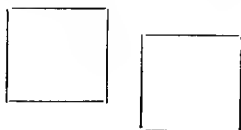
And half creates the wondrous world we see.”

Yet so imperceptible was the approach of the dreaded infirmity, that months elapsed after Gale's sight began

to fail, before either he or his friends entertained the faintest shadow of a suspicion as to the real state of the case. The original cause to which Gale's blindness is attributable was an accident which occurred to him some time before his sight began to fail. He was amusing himself by swinging, head downwards, from the horizontal iron rails enclosing the church-yard, when a slip of the knee occasioned his head to come violently in contact with the hard pavement. For a moment he was stunned and scarcely able to realise the force of the collision. Being conveyed home, the nature of the injuries appeared less severe than might reasonably have been anticipated, and no serious alarm was occasioned thereby. Yet the internal injuries produced by the accident were of the gravest imaginable character, so far as related to the healthy condition of Gale's eye-sight, for those injuries contained the germs of his future blindness.

The first indications of Gale's approaching calamity were scarcely noticeable. Like many thoughtful lads, James frequently amused himself with gazing at the ever-changing fantastic shapes assumed by the passing clouds, or, if he were at home, the numerous eccentric pictures formed in the fire, by the side of which he meditatively reclined. Very vivid and life-like were the scenes thus conjured up by his fervid imagination, as it lingered on the fleecy vapours of the heavens, or dwelt amid the glowing masses of

burning coal ; but gradually the various forms evoked by his rambling fancy seemed to lose their customary distinctness, to acquire a kind of shadowy indefinable appearance, as if seen through a fog, or viewed through a glass, the usual clearness of which had become obscured by moisture or vapour. This mist-like obscurity would oft disappointingly intervene, at times when Gale was rapturously enjoying the rich pleasures of a distant landscape, rendering indistinct and confused every shape not actually close at hand. Sometimes the various objects gazed at by him would appear double, one of the two appearances being seemingly a little lower than the other, thus :—



In his boyish sports, Gale's defective sight frequently occasioned him no little annoyance, the more so that he naturally did not like to reveal to his friends the impaired state of his visual powers. When playing at the juvenile pastime of leap-frog, his weakened eyesight occasionally led him to miscalculate the distance he was expected to leap, thereby causing him to miss his aim and fall heavily to the ground, to the great amusement of his youthful companions, and the sad discomfiture of himself. At last, not

desirous of becoming the laughing-stock of his play-mates, Gale's ingenuity devised a simple expedient for obviating some of the difficulties under which he laboured. He would place a white handkerchief on the back of the boy over whose stooping form it was his turn to jump, and likewise throw straws or pieces of paper on the ground for the purpose of indicating the various points from which he was to leap. Sometimes he would request a comrade to stand, railway signalman fashion, with a piece of newspaper in his hand, for a like purpose. When in-doors, he would occasionally borrow a pair of spectacles, and jokingly put them on his nose, his friends smiling at what they deemed the quaint humour of the lad, and never dreaming until long afterwards of the feverish anxiety which already was beginning to gnaw secretly at his young heart; of the burden which was daily becoming more and more difficult to keep hidden within his youthful breast. While they were smiling, the poor fellow was groaning inwardly with the bitter pang of mental anguish and despair, although he was far from suspecting the worst.

Spectacles, however, brought no relief to Gale. He needed the same kind of glasses as those used by short-sighted persons, but as he did not complain of being short-sighted, the wrong description of spectacles were repeatedly offered him. One day, happening to discover a portion of a broken glass drinking

vessel, such as is commonly employed in bird-cages for holding the water required for drinking purposes by the feathered inhabitants, Gale carelessly held it up and mechanically gazed through the crystal as if it were a spy-glass. To his astonishment, the mist which had so long troubled his vision suddenly disappeared, and he beheld every surrounding object with great clearness. The glass fragment was perfectly pellucid, and of a concave shape, having formed part of the upper portion of the drinking vessel. Those acquainted with the phenomena of optics, will readily understand in what manner the rough concave-shaped piece of glass afforded a means of relief unattainable by the use of spectacles with a *convex* lens. Short-sighted persons require concave glasses to enable them to view properly objects at a distance, even as long-sighted persons are compelled to use a convex lens for the purpose of rendering distinct to them objects which are near. Had Gale or his friends been aware of the law of optics by which these conditions are determined, much of the inconvenience and annoyance to which he was subjected during the earlier months of his impaired vision, might have been obviated. For some weeks he was happy in the possession of his new acquisition, but in an unlucky moment he suddenly missed his treasured bit of glass. Terrible was his dismay. He searched for it everywhere, upstairs and downstairs,

in cupboard and drawer, in box and in bag, but in vain. It had disappeared. Only a trifling, insignificant, and seemingly worthless piece of glass, yet how immense its value to the poor and weeping boy, to whom by its means were unfolded all the pleasures of sight to which the blind are strangers. For days and days, Gale mourned over his vanished crystal treasure; but at last the natural vivacity of youth gradually regained its accustomed influence, and reconciled him to his heavy loss.

At school, Gale's defective sight naturally increased his apparent slowness of comprehension, especially in the more difficult tasks assigned him. The school-master did not possess the slightest knowledge of the insuperable drawback with which his pupil had to contend, or, to do the worthy pedagogue justice, he might have rendered Gale's scholastic duties far less laborious than they really were. Gale, however, alone was to blame for this. He was too proud, too high-spirited, to own the true nature of the difficulty which impeded his scholastic progress. The lad who courageously braved the risk of death, for the purpose of rescuing a drowning comrade, and who showed himself anything but afraid of ghosts and spirits, found himself unable to acknowledge to his parents or his teacher that his sight was gradually failing him. Many were the expedients resorted to by him for the purpose of concealing his growing

infirmity. Among other things he used to learn by rote the whole of his reading lessons before he went to school, so that he might appear to read them more fluently and with apparent ease from the book, wherein his aching eyes could discern nothing but a confused and shapeless mass of words and letters. As the lessons varied according to the position occupied by him in the class, this was a labour of some difficulty. For instance, the first lad would read the first portion of a period, the second boy the second portion, and so on. Each lad's position in his class was generally determined by the time of his arrival in school, the latest occupying the lowermost seats. Gale generally looked to having possession of the third seat, which was situated in the best lighted part of that portion of the school, and would learn beforehand all the lessons which the lad occupying that place would have to repeat; but it sometimes occurred that by accident or otherwise he found himself in the sixth or seventh place, in which case he would persuade the lad occupying the third seat to exchange places with him. If this was not done, Gale had considerable difficulty in reading the required lessons, and would be reprimanded accordingly, the teacher not being aware that defective sight was alone the cause of his pupil's seeming backwardness.

At length the increasing dimness of Gale's sight began to attract the attention of his parents, and the

family physician was called in for the purpose of consultation as to what should be done. He examined the lad's eyes, asked him various questions, and, on a subsequent visit, dropped some stuff of a burning nature on Gale's organs of sight, thereby occasioning him most excruciating agony. Great as was the torture endured by him, James derived no benefit whatever from its application. Indeed it sometimes occurred to him that the injudicious medical treatment to which he was at first subjected, had no small share in accelerating the approach of utter blindness. The eye is a most delicate organ, and extremely susceptible of injury. Dr. Wilson has published a very interesting description of this important part of the human frame.* "Let us glance," says he, "for a moment at its wonderfulness. It is essentially a hollow globe, or small spherical chamber. There is no human chamber like it in form, unless we include among human dwelling-places the great hollow balls which surmount the Cathedral or Basilica domes of St. Peter and St. Paul. The eye is such a ball: the larger part of it, which we do not see when we look in each other's faces, forms the white of the eye, and consists of a strong, thick, tough membrane, something like parchment, but more

* *The Five Gateways of Knowledge.* London: Macmillan and Co.

pliable. . This forms the outer wall, as it were, of the chamber of the eye. It may be compared to the cup of an acorn, or to a still more familiar thing, an egg-cup, or to a round wine-glass with a narrow stem. It is strong, so that it cannot be easily injured; thick, so that light cannot pass through it; and round, so that it can be moved about in every direction, and let us see much better on all sides with a single pair of eyes than the spider can with its host of them. In the front of the eye is a clear, transparent window, exactly like the glass of a watch. If you look at a face sideways, you see it projecting with a bent surface like a bow window, and may observe its perfect transparency.”

Describing the functions of the eyelids and their utility in preserving the eye from injury, Dr. Wilson proceeds to show the action and purpose of the iris, “that beautiful circular curtain which forms the coloured part of the eye, and in the centre of which is the pupil.” We are then told how, “behind the iris is a lens, as opticians call it, or magnifying-glass. We are most familiar with this portion of the eye, as it occurs in fishes, looking in the recently-caught creature like a small ball of glass, and changing into what resembles a ball of chalk when the fish is boiled. This lens is inclosed in a transparent covering, which is so united at its edges to the walls of the eye, that it stretches like a piece of crystal

between them ; and in front of it, filling the space dividing the lens from the watch-glass-like window, is a clear transparent liquid like water, in which the iris floats. This lens is, further, set like the jewel stone of a ring, in what looks, when seen detached, like a larger sphere of crystal ; but which in reality is a translucent liquid contained in an equally translucent membrane, so that the greater part of the eye is occupied with fluid ; and the chamber, after all, which it most resembles, is that of a diving-bell full of water. Lastly, all the back part of the eye has spread over its inside surface, first a fine white membrane, resembling cambric or tissue paper, and behind that a dark curtain ; so that it resembles a room with black cloth hung next to the wall, and a white muslin curtain spread over the cloth. This curtain, or retina, seen alone, is like a flower-cup, such as that of a white lily, and like it ends in a stem, which anatomists name the optic nerve ; the stem, in its turn, after passing through the black curtain, is planted in the brain, and is in living connection with it."

Such is the human eye as described so graphically by Dr. Wilson, whose little work abounds with many equally interesting details. From the quotations above given, it will readily be perceived how delicate and fragile is the organ of sight, and how, in case of injury or disease, the greatest possible care should

be employed in its treatment, lest, by some indiscreet or ill-considered act, the power of vision may become permanently impaired, if not wholly destroyed. Our knowledge of the structure of the eye, and of the exceeding fineness of its various parts, ought also to act as a caution against any excessive strain, such as that occasioned by long-continued reading, on their several powers.

But of all this, young Gale was comparatively ignorant. Like Huber, the famous naturalist, he was extremely fond of reading by moonlight, a practice which certainly did not tend to the improvement of his visual powers, for a more dangerous kind of recreation it is impossible to conceive. The more he studied the weaker became his eyesight, but so powerful was his love of reading, that, notwithstanding his knowledge of the disheartening circumstance that the too frequent indulgence of his taste for books seriously impaired his vision, he could not acquire the requisite degree of self-mastery which would have enabled him to abstain from excessive devotion to a species of pleasure so dearly purchased as his proved to be. At last, the doctors strictly prohibited him from reading at all. Every book was rigorously removed from his reach, and if by any means a volume found its way into his hands, it was speedily taken from him. This was a terrible blow for our young student. To him books had become

almost a necessity, without which life itself appeared scarcely endurable. When, in obedience to the medical fiat, he relinquished the perusal of his beloved volumes, an undefinable kind of feeling took possession of his mind, and he experienced a vague sort of mental presentiment that henceforth he was to be as a stranger to the great world of books. The silent pleasures of literature were sternly forbidden him, and as he, with lingering touch, laid down the volume which he had been attentively reading, a pang thrilled through his youthful heart. How the contents of the page last perused by him fixed themselves indelibly upon his memory, never to be forgotten, but to be treasured and cherished in after days as some relic of a brighter and happier time. The name "Courtenay," with which that page terminated, was the last word ever beheld by the fading eyesight of James Gale. To him it became a kind of mental landmark, indicating with unerring certainty the gloomy period of transition from the pleasures of Heaven's radiant light, to the care and melancholy of life-long darkness. So impressed became the word on his mind, that he determined that if ever he had any children, the first, whether boy or girl, should be named Courtenay. And when in after years a boy was born unto him, the resolve was faithfully carried into effect.

Up to this time, Gale's parents were far from

suspecting the real extent of the calamity which threatened their son. They knew that his vision had become seriously impaired, and was daily becoming weaker, but they never considered the possibility of his becoming entirely blind. On the contrary, they appeared to entertain a conviction that with the aid of proper medical skill, the eyesight of their boy might be considerably improved, or, at least, prevented from becoming worse. With the view of procuring this desirable result, young Gale was taken to Plymouth, in which town resided two or three medical gentlemen who had acquired some reputation as experienced oculists. The result of this visit was by no means reassuring, still there lingered a few gleams of hope. By steady and appropriate treatment, the eyesight of Gale *might* possibly be preserved, but, at the best, it was only a chance—nothing more. The distance from Tavistock to Plymouth was about fourteen miles, and Gale was in the habit of riding one way and walking the other, in compliance with the desire of his medical advisers, who deemed that with the improved state of bodily health induced by active physical exercise, the condition of his eyesight might become considerably bettered. On one of these occasions, after he had left the doctor's house and proceeded some distance on his homeward journey, he experienced a sharp smarting pain in his forehead, to which the doctor

had previously applied some description of blistering ointment. At first James took little or no notice of this circumstance, but as he proceeded on his way the pain became more and more acute and unbearable, until at last he could scarcely contrive to find the strength necessary to enable him to continue his homeward walk. Weary and depressed with physical suffering and fatigue, Gale's thoughts perpetually reverted to the future, which seemed to him a sad and hopeless blank, in which joy and pleasure existed not. He was no longer the gay and blithesome youth whose mad-cap frolics and love of mirthful adventure had already become famous among his numerous friends and neighbours. The hand of affliction lay heavily on him, and, young as he was, he felt himself humbled to the dust. As he silently crossed Robernough Down, the heaviness of his spirits increased. He beheld no beauty in the lovely and ever-changing panorama, which lay extended before him. To his gaze the valleys of the Walkham and Meavy, embosomed amid proudly rising hills, possessed no charm. The countless glories of Nature which surrounded him on every hand, the tiny flowers spangling with gem-like lustre the slopes of the grassy down, the leafy groves of Bickham, the stately eminences in the purple distance, had each lost all their old attractions, and seemed, by their very calmness and repose, to mock the terrible agony which tortured

his youthful heart. He tried again and again to shake off the bitterness of soul which inwardly consumed him, but his efforts proved utterly futile. The vampire Care was preying on his mind, and would not relax the tenacity of its hold. At length, completely worn out with his exertions, he despairingly flung himself on the soft cool grass, and sadly rested his face in his cold trembling hands. Near to him flowed the silvery waters of the brook constructed in olden times by Sir Francis Drake, for the purpose of bringing a supply of pure water from Dartmoor into the town of Plymouth, for the use of the inhabitants; but the soothing music of the rippling current remained unnoticed by the anguished lad. The gay blossoms which grew on the water's edge, and coquettishly peeped at their forms reflected on its mirror-like surface, tempted not his ruthless grasp. He felt within himself that he was growing blind, and that the fatal time was not far distant when all the glorious loveliness of Nature, the unspeakable magnificence of the heavens, the happy smiles of those he loved, and the thousand and one objects with whose forms he had become familiar, would be wholly hidden from his straining gaze, never, perhaps, again to be revealed unto him in this life. As Gale thus sorrowfully mused on his hopeless condition, a strange fascination irresistibly impelled him to glance down upon the glittering surface of the stream. How

still and placid seemed its cool waters to the feverish gaze of the lad ! They appeared to breathe of balmy rest, of sweet cessation from pain and suffering ; and as he looked at the tempting element, Gale gradually drew himself nearer and nearer to the brink of the water. Slowly a dread and terrible resolution began to shape itself within his smitten mind, and, with the author of the now-forgotten tragedy of " Themistocles," he found himself mentally enquiring :—

" Is life so sweet,
With all its pains, that death's great writ of ease
Should be so dreadful to us ?"

Why should he continue to live ? Would he not be always a helpless burden to himself and to others ? " Far better to die," thought he, " before it has come to the worst, before the agony of pain and despair has awakened the tortures of unavailing regret, than to live and be for ever helplessly miserable." Blinded by his fears, and maddened by the pain occasioned by the sharp cutting breeze playing across his blistered forehead, he could not perceive the mental cowardice which animated his unhappy musings. The intensity of his suffering had almost deprived him of reason. He scarcely knew what he did. Instead of manfully bearing his cross, he would fain have plunged with it into that dread and solemn abyss which borders the shores of eternity. Had he read Quarles' Emblems, perhaps his memory might

have recalled that quaint but pious author's touching question :—

“ And wilt thou not, coy wretch ! drink one poor sup
Of bitter drink for Him that drank a cup
To sweeten thine ? ”

But there was no kind and sympathising friend at hand. At the critical moment when the unfortunate lad most needed the subduing influence of consolation, he lay, weeping and alone, face to face with a horrible temptation. A few moments more, and he might have yielded to the grim reasoning of his sorrowful meditations. But at that very moment he found himself loudly hailed in a loud, cheery manner. It was the voice of a friend of his father's. The owner of the voice was returning from Plymouth to Tavistock, and as his vehicle was proceeding rapidly onwards, he caught sight of Gale's apparently inanimate form reclining by the side of the canal. This providential interposition perhaps saved Gale from the perpetration of the rash and unpardonable act which, but a few moments previously, he was gloomily contemplating. Accepting the generous offer of a seat in the vehicle, he returned with his preserver to Tavistock. As he rode homeward, he frequently thought, with a shudder, of the imminent danger escaped by him, and became once more resigned to his unpleasant fate, reminding us of Joanna Baillie's sadly touching lines :—

“ When urged by strong temptation to the drink
Of guilt and ruin, stands the virtuous mind,
With scarce a step between ; all-pitying Heaven,
Severe in mercy, chastening in its love,
Oft-times in dark and awful visitation,
Doth interpose, and leads the wanderer back
To the straight path, to be for ever after
A firm, undaunted, onward-bearing traveller,
Strong in humility, who swerves no more.”

On arriving home, his parents were unmistakably alarmed at his appearance. His forehead had become completely covered with blisters, and seemed as if it had been exposed to rough usage. A few words explained all. It was afterwards ascertained that the Plymouth oculist had never intended his young patient should return home on foot, such a proceeding being most dangerous. As it was, some time elapsed before James fully recovered from the mental and physical effects of his eventful journey.

It should here be mentioned that about this time Gale was member of a juvenile temperance society, or, as these associations are now named, “Band of Hope.” As such, he had deliberately pledged himself not to use as beverages any kind of liquors containing alcoholic ingredients. This resolution was for some time faithfully adhered to by him, but one day the family doctor prescribed for Gale half-a-pint of porter per diem. James at first steadfastly refused to comply with the doctor’s orders, but perceiving the futility

of open resistance, he had recourse to a *ruse*, and quietly substituted a pint of milk for the half-pint of beer. He did not at all relish the idea of violating the principle of the association to which he belonged, but at that time the medicinal value of total abstinence was recognised by a very few only of the medical profession, the majority of physicians contemptuously pooh-poohing it. At the expiration of a few days, the doctor, finding no improvement in the health of his patient, sharply enquired whether his injunctions had been implicitly followed. It soon transpired that they had never been attended to. He consequently became very angry, and, being seconded by Gale's parents, his decision at last prevailed, James being compelled, partly by entreaty, partly by parental command, to sacrifice his teetotalism, and drink his half-pint of beer per day. To many this incident may appear a very simple affair, yet it strongly illustrates the thoughtless manner in which the most energetic efforts of the social reformer are sometimes mischievously counteracted. An inordinate love of drinking forms the bane of English society, contributing, more than any other single cause, largely to the immense mass of poverty, vice, and crime, which has so long cumbered the healthy development of our national prosperity, and darkened the horizon of our country's future. It is admitted that no greater boon can be conferred upon society

than the education of its younger members in habits of temperance. This is precisely the primary object of our Bands of Hope. By rearing up from childhood a number of non-drinkers belonging to both sexes, not only are these useful associations tending to diminish the already fearful amount of national intemperance, but also to prepare the way for even yet greater social and moral reforms of the most lasting nature. There can be no kind of education more effectual, more valuable, than that which enables a young man to withstand the numerous inducements to drink with which he is continually beset, and which, once yielded to, but too frequently lead the way to that yawning abyss of dissipation and reckless improvidence into which so many reputations, fortunes, and brilliant chances have been ruthlessly flung. Had James Gale, in his after years, become a victim to the glass, the fault would have rested with the medical man, who, instead of encouraging his patient in the praiseworthy attempt to conquer the cravings of an unnatural appetite, insisted on its being daily fed and stimulated with the very food upon which, like some hideous monster, it ceaselessly thrived and grew.

Months passed away, Gale was progressing towards manhood, but his powers of vision continued to decrease. He had for some time abandoned the pleasure of reading, and, despite his natural vivacity of spirits,

not unfrequently felt himself becoming dull and cheerless. At length it became apparent that there existed no hope of recovery for his eyesight. It was a heavy blow for him ; but another, yet more terrible, was slowly preparing. One day, after visiting as usual the oculist under whose care he had been placed, and who, by an extraordinary coincidence, has himself since become totally blind, Gale was kindly but firmly told that nothing more could be done for him, that the known resources of medical knowledge and skill had become exhausted, and that he would in due time become utterly and incurably *blind* ! Gale started as if he had been shot. The doctor's words had in a moment swept away every dream, every secret hope of his future life. The verdict was not altogether unexpected, yet how disheartening did it appear. Blind ! To be shut out for evermore from the joyous contemplation of the magnificent works of Nature ! Blind ! To view no more with ardent gaze the beaming features of his beloved parents ! Blind ! Henceforth to move alone and helpless in a world which to him would possess not form nor colour, to be surrounded by an impenetrable veil of darkness, through which the blessed light of heaven would be unable to pierce ! No ! The mere thought was agonising torture. It could not be. He felt stunned, paralysed as it were.

" Blind,—blind,—blind !" he continually murmured

to himself. "Why should I be blind?" And then a fierce rebellious spirit would furiously arise within him. But not for long. Perceiving his patient's emotion, the kind-hearted doctor placed his hand upon Gale's shoulder and bade him be of good cheer.

"Who knows," he said, "but what I may be blind also! My sight is slowly failing me, even as yours is."

But Gale refused to be consoled.

"You *have* seen the world," he bitterly replied, "I have yet the world to see. You can feast your mind on the sweet remembrance of what you have seen. I have no such intellectual treasures to fall back on."

The worthy oculist felt deeply the anguish evinced by his youthful patient. He spoke kindly to him, reasoned with him, and bade him not despair. No amount of repining, or bitter lamentation would make his fate any the lighter. James instinctively felt the truth of this, and, hastily dashing away the big tears which had risen to his eyes, courageously summoned to his aid the sturdy power of mind which had so frequently served him in good stead. Now that he knew the worst, he would prove no shrinking craven.

"If God wills it," said he, and there was no faltering in his tones as he spoke—for he was thinking of a certain passage in the Sacred Volume*—"He knows

* "I will bring the blind by a way they know not." Isaiah xlii. 16.

best. He will lead me by a path I know not of. What *must* be, *will* be."

At that moment, as if in answer to his thoughts, new and brave resolutions shaped themselves in his heart. He would not be disheartened. He would conquer fate, and show the world that his nature was formed in the true mould. He would learn to rely on himself, to become independent, as far as possible, of assistance, not allowing others to do for him what he could himself perform. He might be blind, but he would not, if he could possibly avoid it, be helpless. Thenceforth James Gale never uttered a word of complaint, but nobly, bravely, and heroically awaited the hour when the rapidly-closing portals of his eyes should refuse to admit the light of day. With the gentle-hearted Hannah More, he in spirit exclaimed :—

"Lord, I submit. Complete Thy gracious will,
For if Thou slay me, I will trust Thee still.
O, be my will swallowed up in Thine,
That I may do Thy will in doing mine."

Gale's sight began now to fade somewhat rapidly, and before long he became, but almost imperceptibly, utterly blind. The calamity had been so long anticipated, that when it occurred Gale took it very composedly. He had made up his mind to the fact that he was destined henceforth to take his place among the sightless population of his native country,

and consoled himself with the soothing reflection that although he had become visited with the deprivation of sight, it was fortunate for him that the sense of hearing had not been taken away from him also. On becoming blind, Gale, who was now about seventeen, constantly received numerous expressions of sympathy from those who were acquainted with him; but he was never heard by any one to breathe a murmur of discontent, or seen to shed a tear, when reminded of his irreparable loss, so strong was the amount of self-control which, fortunately for his equanimity, he had contrived to acquire. One exceptional incident, however, is recorded of him. About twelve months after his blindness, he was at a picnic at Launceston, in the vicinity of Tavistock, when a young lady, who had been amusing herself by sketching some of the beautiful scenery in the neighbourhood, began enthusiastically describing the various attractions of the landscape spread out before them; the plains clothed with rich verdure, hills glowing in the bright sunshine, streams glittering as they flowed musically onwards, and many other entrancing features remembered, alas! but too well, by her sightless listener, who, recalling to his mind the saddening fact that only a few brief months previously he was himself gazing on the very scene so poetically described by the fair disciple of the pencil, could scarcely conceal his agitation. Groping his way to a

secluded portion of the ruined abbey, in the grounds of which the party was being held, he gave way to a flood of tears, weeping and sobbing like a child. While thus engaged, he was surprised by the young lady, who, divining the cause of his sorrow, apologised in the kindest and most considerate manner for her thoughtlessness of speech. The result of that incident was characteristic. Gale firmly resolved never again to betray a similar indication of weakness.

“God helping me,” he said; “I will never shed another tear, or cause sadness to another by my affliction.”

So inflexible, so resolute, was his determination, that to this day the vow has been faithfully maintained inviolate, although with Joseph Brennan, one of the editors of the “New Orleans Delta,” he might have said:—

“Around me is a darkness omnipresent,
With boundless horror grim,
Descending from the zenith, ever crescent,
To the horizon’s rim ;
The golden stars, all charr’d and blacken’d by it,
Are swept out one by one ;
My world is left, as if at Joshua’s fiat—
A moonless Ajalon !”

CHAPTER V.

“Dark is the house in which I dwell,
The shutter’d windows close and mute,
For never beam of heavenly light
Athwart their solemn bars may shoot.”

H. van Landeghem.

“The Lord openeth the eyes of the blind.” Psalm cxlvi. 8.

BLIND LIFE.

BLIND! What a world of mental pain and suffering is contained in that simple word! What a vast amount of hopelessness and despair does it but too frequently express! It is difficult to realize the full intensity of the loss sustained by those who have become deprived of the sense of hearing; but even a little child can understand the terrible nature of the dread calamity which shuts out a man from the pleasurable contemplation of the beautiful in Nature. We all know, to use the language of an eloquent writer, that the blind “are debarred from receiving enjoyment from the gladdening rays of the sun,” and that “the flowers bloom for them in vain, for they cannot delight in their vari-coloured tints.”

And ever commingling with the strange sympathetic feeling thereby produced, we instinctively feel a strong under-current of poetic interest not to be found elsewhere. We talk of the blind, and straightway there riseth before our vision the venerable form of the sightless bard whose mighty genius has enshrined the mythic history of ancient Greece in deathless verse. We think, too, of blind old Bartimeus standing at the gate of Nazareth, calmly yet earnestly awaiting the coming of One whose simple touch could make the blind to see and the deaf to hear. Muse we not also on the genius of that blind dreamer, who, calmly turning aside from the clash and din of politics, breathed to us the grand and wondrous story of "Paradise Lost!" and as we do so, we feel that in the midst of their great affliction, our poor sightless brethren have become invested with a strange halo of abiding interest, and even poetic dignity. A blind man appears to us the perfect realization of human helplessness, and when he successfully performs some simple feat, or some little task, which we, in our inexperience, imagine can be executed properly only by those possessing the advantages of eye-sight, we are struck with admiration at his genius, skill, ability, or whatever we choose to deem it. Yet it is very questionable, to say the least, whether the actual condition of the blind is so pitiable, so utterly miserable, as that of the deaf and

dumb. By means of proper education, it is astonishing what immense facilities are placed in the way of the blind, both in the acquisition of useful knowledge and the utilisation of that knowledge so gained. It is the *ignorant* blind whose condition ought to awaken our sympathy and regret ; the *educated* blind need it far less than is generally supposed. As James Gray, himself a sufferer from the deprivation of sight, sensibly remarks,* “ The feelings and capacities of the blind, as a class, are about as little known to the public at large as the inhabitants of China or Japan. By some they are represented as endowed with more than ordinary powers ; by others as so utterly helpless, as not to be able to do the most common offices for themselves. In this, as in most other cases, the truth lies midway. A blind man’s endowments are just the same as the sighted in the same rank of life as himself, only that being deprived of the sense of seeing, the remaining senses are sharpened and quickened by being more frequently used and trusted, in the same way that the arms of a blacksmith are more muscular and powerful than those of a dancing master, or the eye and ear of the Indian more quick than those of the civilised man.”

As the eyes of the deaf are generally more closely observant than those belonging to people possessed

* *What is doing for the Blind.* By James Gray.

of the sense of hearing, so the ears of the blind are extremely sensitive of sounds which sighted people would scarcely notice. The sight of deaf people does not, as a rule, become keener or more acute by reason of their deafness, but, being more closely trained, it becomes more reliable and tenacious. Thus the memory of a deaf man may be defective in its recollection of *dates*, which are unseen ; but it will scarcely ever forget an object, or succession of objects, which have been seen by the eye of the man so deprived of hearing. Take an intelligent deaf man by daylight, or even by night, through a neighbourhood new to him, and he will remember it ever afterwards. So with the blind. Their inherent powers of hearing are not increased, but they are called more frequently into play and their capabilities more fully developed. The loss of hearing renders the deaf more ready to perceive and appreciate the more pleasing and genial features owned by the world of art and nature. Dr. Kitto says,* “It (his deafness) has, I believe, in the first place, developed a sense of the beautiful in nature and art, and a love for it—a passionate love—which has been to me a source of my most deep and pleasurable emotions.” The blind, on the contrary, delight in all that administers to the gratification of the ear, and by reason of their powers of hearing, of

* *The Lost Senses : Deafness.*

being enabled to participate in the pleasures of conversation, are generally less reserved and morose than are the deaf.

One predilection, however, both deaf and blind share in common. This is the love of reading. But here the deaf man has an immense advantage over his sightless brother, who, if he be poor and friendless, having no one to read to him, is as completely shut out from the great world of books, as if it never existed. James Gale's fate in this respect was more fortunate than that of most blind people. When he found himself deprived of sight, his affliction was considerably lessened in degree from the circumstance of an amanuensis having been provided him, with the assistance of whom he was enabled to continue the various studies which had been so abruptly interrupted by the occurrence of his blindness. Had Gale's parents been unable to incur the expense of this description of intellectual aid for their son, his case would have, indeed, been of a most disheartening and melancholy character. He would have found much of his earlier education thrown away, and himself forcibly debarred from enjoying the ordinary pleasures of literature. To him printed books would have proved utterly useless, unless he could have procured the services of some obliging friend to read them aloud to him. In this dilemma he might have dreamed of having recourse to the various books

printed in embossed characters, so as to be read by merely touching the letters with the fingers, but here fresh and almost insuperable difficulties would be awaiting him. He would find nearly a dozen rival systems of printing in use, each differing from the other, but all agreeing in the substitution of a curious kind of signs and abbreviations for the customary letters of the alphabet and the common kind of words. If he learned one of these systems, he would be enabled to peruse any books printed in accordance therewith, but works printed in conformity with other systems would still remain to him as sealed volumes. Short-hand is an art difficult of acquirement, even by those who have the eye to assist their memory, but before the blind can wade through the limited amount of literature specially provided for them, they must attain a complete mastery over no less than *eight* different alphabets and modes of spelling, each of which forms a species of short-hand more or less complicated. Can we wonder then at the small proportion of sightless people who are able to read, or that books printed in embossed type are too expensive for the poorer class of blind? This diversity of educational systems constitutes one of the chief obstacles met with in promoting the education of those who may be deprived of sight. Imagine for one moment that, instead of one language in this country we had eight, and that we were to

use all eight in common. How difficult would be the work of education ! Our newspapers would have to be printed in eight different languages, and penny daily journals would become an impossibility, the cost of production being increased eight-fold. The paper which is now sold for one penny would, under such a *régime*, cost eightpence, or more probably, one shilling ; while our shilling magazines would cost each at least half-a-guinea. If we had one uniform system of printing for the blind, there exists not the slightest reason why our sightless population should not have their own books, magazines, and newspapers, as well as their sighted brethren. The Rev. B. G. Johns, Chaplain of the Blind School, St. George's Fields, says,* referring to the different rival systems of embossed printing invented for the use of the blind, that "so fierce and so bitter has been the war waged over the knotty problem, and so eager have the partisans of each new invention been to claim for themselves the discovery of the one, sole, best method, that the blind man's library now consists of a very few volumes, only to be had at a price which puts them almost entirely beyond the reach of the class who most need them." The more shame that such a condition of affairs should still be tolerated.

As we have before observed, Gale was, fortunately

* *Blind People* : Their Works and Ways. London, Murray

for himself, spared many of the inconveniences which usually beset the path of the blind, and, with the aid of an intelligent amanuensis, was enabled to prosecute with success, the various studies in which he chiefly delighted. He neglected no opportunity of acquiring fresh stores of knowledge, and, remembering his resolution of self-help, spared no pains to render himself, as far as possible, independent of the assistance proffered by others, so that there might be no occasion for others to do for him anything which could be readily performed by himself without their well-intentioned aid. In this respect the after-life of Gale became an instructive exemplification of the soundness and general accuracy of the views expressed by Dr. Blacklock, in the remarkable article on the "Blind," written by him for the original edition of the "Encyclopædia Britannica." In that article, Dr. Blacklock, who was himself a sufferer from blindness, remarks that, "Parents and relations ought never to be too ready in offering their assistance to the blind in any office which they can perform, or in any acquisition which they can procure for themselves, whether they are prompted by amusement or necessity. Let a blind boy be permitted to walk through the neighbourhood without a guide, not only though he should run some hazard, but even though he should suffer some pain. If he has a mechanical turn, let him not be denied the use of

edged tools ; for it is better that he should lose a little blood, or even break a bone, than be perpetually confined to the same place, debilitated in his frame, and depressed in his mind."

There can be no reasonable doubt that the ever-ready flow of spirit, mirthful vivacity, and untiring energy which form such conspicuous traits in the character of James Gale, owe much of their later development to the free and unrestrained manner in which he was permitted to follow the general bent of his studious and enquiring disposition. He was given to understand that if he chose to rely on himself, he was at full liberty to do so. He was also fortunate in another respect. Instead of completing his education amongst the blind, he continued his studies in company with the sighted. And here we would indicate what appears to be a fundamental error of most English institutions for the blind. They have a tendency to isolate the blind from the rest of mankind, to educate them as a separate class, for whom all ordinary methods of instruction adopted by the sighted are useless. Of course there is much to be said on their side of the question, and we fully admit that, on the whole, our blind institutions have done much good ; but we strenuously maintain that they might have done more—that they ought to be rendered considerably more efficient. It is a curious and suggestive fact that of the long and illustrious

list of blind men who have distinguished themselves in many ways by the exercise of their skill, ability, or genius, scarcely one has been known to have been educated in an institution designed for the education of the sightless. Mr. James Gray, whose work we have on a former occasion quoted, distinctly asserts that there has been a very general opinion that the English school system is insufficient to meet the wants of the blind, and that, "tested by the experience of the blind themselves, it may be said to be a failure."* It is also said that not one in twenty of those reared in the blind schools of Paris are enabled to gain their own livelihood upon leaving those institutions; and that the same may be asserted of many English schools for the blind. The Rev. B. G. Johns appears rather doubtful as to the results of the blind being educated in common with those in the possession of sight, but he admits that the experiment has never been fairly tried. In the case of a single lad deprived of sight being sent to a school where all his companions possessed their powers of vision, Mr. Johns readily allows that, under certain circumstances, the question may be answered in a clearer and easier manner. Everything here would depend on the character of the school. "For a boy of ordinary ability," says Mr. Johns, "while young,

* *What is doing for the Blind.*

there can be no doubt that in a good school, under a good master, very much may be done among scholars of his own age who have sight. He can read, cypher, and even write from dictation, with his class ; it may be more slowly, but not less correctly, than his companions ; while, in all that they are taught orally, he least can take a good share. If he has brains, and is fairly cared for at home, his religious instruction may be almost identical with theirs. The grand thing is in every way to lessen his sense of isolation, to show him that he is not meant to be cut off from the rest of the world, but as far as possible to feel, to think, and to act as others do.”* Again : “ The less he thinks of himself as belonging to a separate, special kingdom and race, the more broadly and deeply he learns to see that he is bound to others, as others are bound to him.”† Surely we here have testimonies sufficient to prove the urgent need for some improvement in the present existing systems of education for the blind.

It has oftentimes been asserted that the deprivation of sight is, in the case of individuals who have learnt to enjoy and appreciate its blessings, generally attended with a weakening of the remaining senses ; but the correctness of this assertion is, to say the

* *Blind People : their Works and Ways.* Page 122.

† *Ibid.*

least, somewhat questionable. That in the case of weak natures, a sudden infliction of this character may cause an almost total prostration of spirits and energy is most probable but; in the majority of instances, the first instinct of the blind is to seek some means of counteracting or ameliorating the misfortune to which they have been subjected. Deprived of the sense of sight, they learn to rely more and more on the senses of touch and hearing, until the organs of those senses, attaining a wonderful degree of susceptibility, almost compensate for the loss of sight. The history of John Metcalf, better known as "Blind Jack," of Knaresborough, supplies an instance in which *four* senses were frequently made successfully to perform the work of *five*. Among other things he was a good horseman, and, although he had been blind ever since the age of three, he was excessively fond of hunting. He also on one occasion won a race, a fleet horse and the assistance of friends in ringing bells along the course and when he had arrived at the turning point, enabling him to gain the victory. Something similar is related of James Gale. Being out one day riding with a friend, it was proposed that the two should ride a match. Gale, nothing loth, consented. The signal was given, off started the rival horsemen, and after a smart run of some six miles, the "sighted" rider was completely beaten by his sightless adversary.

The manner in which the sense of hearing becomes developed by constant training in the case of the blind, has always afforded a theme of wonderment on the part of those unaware of the latent powers possessed by the various senses. Allied with a corresponding mental development, it produces results often perfectly unaccountable to those who have not carefully studied cause and effect. Thus a tap with his stick on the floor, sometimes enables an intelligent blind man to detect whether the room be full of furniture or empty. Speak for five minutes to him, and if he be an observer of character, he will frequently be enabled to ascertain your height, whether you be stout or thin, young or old, and many other particulars, as clearly as if he possessed his full powers of vision. The old saying relating to the alleged folly of the blind leading the blind does not always hold good. Sometimes the blind man may prove a more efficient guide than an individual rejoicing in the possession of sight. This fact is characteristically illustrated by one of the incidents related of Gale's blind life. Returning, in company with several other persons, in a carrier's van, from Plymouth to Tavistock, one dark night, Gale suddenly told the driver that the horses had missed their way and that they were on the wrong road; that, in fact, they were proceeding in the direction of Dartmoor instead of Tavistock. The driver, however, merely

laughed at Gale's remonstrance. How could a blind person know whether the vehicle was on the right road or not? The idea was preposterous, and so he chuckled the louder and waxed bolder in his rebuffs. But Gale was not to be put down in this manner. He insisted that they were *not* on the Tavistock road, and proffered, if the others would wait for him, to get down in the dark and find the right road for them. It should here be mentioned that after reaching Roborough Down, about six miles from Tavistock, the road divides in three, the centre road leading to Tavistock, and that on the right leading towards Dartmoor, so that on a dark night an experienced traveller might naturally be led to mistake the proper route, especially as there were no hedges or buildings near to act as landmarks. At first, the carrier, somewhat irate that his experience should be questioned by a *blind* passenger, demurred to Gale's proposal; but the other occupants of the vehicle, becoming somewhat uneasy, insisted that an attempt should be made for the purpose of ascertaining whether they were on the proper road or not. Accordingly, Gale descended, his first act after which being to turn his face in the direction in which they had come, and to utter a low, peculiar murmuring cry. Listening attentively for a few seconds, he heard the sound faintly echoed from a rock or "tor," which he knew to be situated on Roborough Down, thereby confirm-

ing the accuracy of his suspicions. He next turned partially round, and with his feet felt carefully for the junction of the down with the edge of the road. This gained, he proceeded steadily onward until he arrived at the acute angle formed by the junction of the road with that leading to Tavistock. The occupants of the van were then apprised of Gale's discovery, the route was retraced, and in due time the passengers arrived safely at their appointed destination, instead of finding themselves proceeding in a contrary direction. Now the question arises, how did Gale know that the proper road had been deviated from? The reason given by him is simple enough. The *sounds* occasioned by the vehicle in passing over the Dartmoor road were unlike those with which he was familiar when travelling on the Tavistock road. Hence his apprehension of the mistake committed by the carrier.

Similar instances of accurate observation are common amongst the intelligent and educated blind. Thus it is related of the celebrated Dr. Henry Moyes, who lost his sight when three years old, that when introduced into company, he remained for some time silent. During this period of conversational inactivity, he was mentally calculating from the sound of the voices heard by him, the dimensions of the room, and of the number of persons present; and so accurate was his discrimination, and so retentive

his memory, that his conclusions were seldom erroneous. In some respects, James Gale acquired much of this proficiency in the art of what, as an Indian once expressed it, may be termed "making eyes out of ears."

Notwithstanding his blindness, Gale continued, when opportunities occurred, his rambles as heretofore in the vicinity of Tavistock, with every locality of which he became so thoroughly acquainted, that sometimes his guidance proved useful to strangers. On one occasion a minister was about to proceed to Calstock, for the purpose of taking part in some services to be held in that town. Being unacquainted with the route, he accepted the offer of Gale, of whose sightless condition he was not aware, to act as guide. They proceeded along, arm in arm, very comfortably, and conversing pleasantly with each other, the minister not having the least notion of Gale's blindness, although he suspected his eyesight to be a little impaired. At last they came to the ferry at Morwelham, across the Tamar, which river divides Devonshire from Cornwall. Here Gale could keep up the delusion no longer, and then the minister ascertained, to his utter amazement, that he had been entrusting himself to the care of a sightless guide. James, however, proceeded with the minister to Calstock; and at the conclusion of the services, he volunteered, the night being dark and stormy, to

guide the minister by another and safer, though somewhat circuitous route. The proffered help was readily accepted, and the two returned by way of Gunnis Lake, where there was a bridge across the Tamar; but so intense was the darkness, that the minister could hardly see anything in front of him, but groped about as one bewildered. Yet Gale kept steadily onward, turning neither to the right nor to the left, until the "sighted" man was compelled to acknowledge that in such an emergency the mere possession of eyesight was of little use, that an experienced blind man was a safer guide than an inexperienced man possessed of eyesight.

We have alluded to Gale's *penchant* for horse-riding. To many this might seem a very dangerous kind of recreation for a blind man to indulge in, yet, as in the case of Johu Metcalf, Gale's natural aptitude rendered it far less harmful than it appeared to those not initiated in the ways and capabilities of the blind. Very frequently James would amuse himself by accompanying a friend who had occasion to travel daily to and from Plymouth, and at times he was permitted, notwithstanding his blindness, to take charge of the horse's reins during the return journey. On these occasions his old boisterous spirits, spiced with a love of mischief, would again break out, and lead him into the perpetration of various practical jokes, of a class similar to those committed by him

in his earlier days. One of these is worth relating. The turnpike gate on the Plymouth road, near to Tavistock, was kept by a shrewish old dame, whom busy-tongued rumour asserted to be rather fond of the bottle. Whether the accusation was true or not, it is certain that on their homeward journey at night, Gale and his friend would be kept waiting an inordinate length of time, until it pleased the aged guardian of the gate to descend and permit them and their vehicle to pass through. When she did at length make her appearance, key in hand, for the purpose of unlocking the wooden barrier, her unsteady gait and voluble flow of language naturally suggested the inference that she had been partaking of something more potent than "the cup which cheers but not inebriates." At last, Gale, wearied out with her repeated dilatoriness, resolved to play, by way of punishment, a harmless trick on the old lady. It was her invariable custom, after unlocking the gate, to examine the hinder part of the vehicle for the purpose of ascertaining whether it was empty or not. If empty, no toll was demanded ; but did it contain any packages, fresh toll was required. One evening, before returning from Plymouth, Gale caused his friend to have the back part of the van, which was a covered one, so fastened that it could not be opened from behind. Arriving at the gate, its custodian, after the usual amount of delay, made her

appearance, opened it, and proceeded to the examination of the hind portion of the vehicle. Finding this impossible, in consequence of the manner in which it was fastened up, she returned to the front of the van, where Gale was sitting, a mischievous smile lurking on his sightless features, and vehemently insisted upon being allowed to inspect the interior of the van.

"All right," was the response. "Make haste up, and jump in."

Complying with his injunction, the unwary gatekeeper ascended the vehicle, but no sooner had she placed her foot in the interior, than away went the horse at full trot. At first she did not understand the nature of the joke, but she soon began to perceive the manner in which she had been victimised. Then began a series of entreaties, threats, prayers, and expostulations, commingled in most ludicrous confusion, to Gale, who pretended to have lost all mastery over the horse driven by him. In this wise the ill-assorted trio proceeded for upwards of a mile, when the old lady was permitted to descend, which she did with some alacrity, at the same time vowing no end of revenge against James. It was noticeable, however, that ever afterwards she was less uncivil and termagant-like in her demeanour towards him and his companion, whenever they had occasion to pass through the gate.

Another equine anecdote is also related of Gale. One evening, being at a party held in a farmhouse some little distance from Tavistock, he was reminded by the warning strokes of the clock, that it was time for him to return home, but the worthy farmer, whose guest he was, would not hear of his leaving. He promised Gale that if he would stay a little longer, he should be allowed the use of a pony for the homeward journey. On this James consented to remain another half-hour or so. The moment of Gale's departure having arrived, the pony was brought by a servant to the farmhouse door, and James, with some alacrity, mounted the animal's back. Bidding farewell to the farmer, he started off, accompanied by a servant with a lighted lantern, for the purpose of opening the farm-gate through which Gale and the pony would have to pass. As they neared the gate, Gale, eager to hurry homeward, pulled the rein somewhat tightly, on which the animal began rearing. Thinking the pony was startled by the light which he knew to be carried by the servant, Gale bade him extinguish it, upon which the man irresistibly uttered a laugh, for he was acquainted with a fact of which the sightless equestrian was ignorant—that the pony was stone *blind*! However, he readily complied with Gale's request, and in a few more minutes the animal and its blind rider were jogging quietly on in the direction of Tavistock. Gale thought it very

strange that the pony should prefer trotting along the edge of the road, but supposed it was a habit acquired from the owner. Suddenly he was hailed loudly by some one, out of breath with running, from the direction of the farm. Halting until the new-comer had arrived alongside of him, Gale found it to be a man whom the farmer had sent for the double purpose of seeing him safely home, and of returning with the pony to the farm. James was much annoyed at this. He always disliked being deemed incapable of taking care of himself, and in the present instance the man made his interference more offensive by the manner in which he conducted himself. Several times he saucily expressed a desire to mount the pony, suggesting that Gale should ride behind him. James, however, would allow nothing of the kind. He had too much confidence in his own powers of horsemanship to trust himself to the mercies of one to whom he was a stranger. At last it was agreed that the man should ride behind Gale, who soon found that his companion was no horseman. In fact he was a tailor, more used to sitting cross-legged on his board than to riding horses. At every jolt he clutched hold of James in such a manner that the two were frequently near falling to the ground. Wearied of this kind of thing, Gale at last bade the man let go, and as the fellow complied with his request, James quickly gave the animal a spur, and

administering a slight push to his companion, the latter found himself unexpectedly on *terra firma*, while Gale was hurrying on in the direction of Tavistock. "You will find the pony at the Queen's Head," were Gale's parting words, and so it proved, for on the man's arrival at Tavistock, he went straight to the hostelry mentioned, and there found the animal as promised by Gale.

Another anecdote is related of James Gale, which, had it occurred in the time of the Stuarts, might have led to his being accused of witchcraft. Being present at a pigeon-shooting match, he earnestly begged that he might be allowed to have a shot at the solitary bird remaining captive after the conclusion of the match. His request being granted, he borrowed a gun, and taking his stand at the proper place, he raised his weapon and awaited the signal to fire. Extraordinary as it may appear, Gale's shot actually brought down the poor fluttering creature, to the great astonishment of those who had previously amused themselves with remarks not very complimentary to the skill or wisdom of the blind marksman. After this, he was frequently pressed to take part in pigeon-shooting matches, but, like a sensible man, he declined risking the reputation thus unexpectedly gained by him. "It was my first shot, and it shall be my last," was his reply to all inducements, and nothing could shake his resolution.

But these ebullitions of Gale's frolicsome spirit did not distract his mind from the contemplation of other and graver matters. He had now fully arrived at the threshold of manhood, and more than once the question occurred to him, in what manner his future life was to be shaped. Was his path always to remain one of a solitary character, or should he be enabled to find some loving soul, some tender-hearted being, whose kindly voice and congenial companionship should render his onward path more bright and pleasant? But he was *blind*! Who would care to wed a sightless man? He had heard of Francis Huber's love for Marie Lullin, and how the devoted girl, regardless of her admirer's loss of sight, proudly and solemnly linked her fate indissolubly to his at the holy altar. But then, Marie Lullin had become acquainted with Huber long before he had lost his sight, at a time when the earnest Swiss youth could fondly gaze on her cheerful features, and mark the wild flash of joy which animated her lustrous eyes, as he held converse with her. The Rev. G. B. Johns has told us* the touching story of the sightless naturalist and his devoted wife. The marriage of Francis Huber to Marie Lullin, we are informed, "was the beginning of forty years' married life of almost unbroken happiness. She was

* *Blind People: their Works and Ways.*

his friend, companion, and a loving wife; his reader, amanuensis, secretary, and—as he said—a good pair of eyes for him, a right hand in all his troubles, and a light for his darkest days.” But who would act the part of the gentle and brave-hearted Marie Lullin to James Gale? Poor fellow! never did he feel affliction more keenly, more bitterly, than when he had actually commenced fighting—almost alone and unaided—the stern battle of life. But even here, the old indomitable Devonshire spirit came to his assistance. Why should his blindness prove an obstacle to his obtaining the heart of a really kind-hearted and worthy maiden? At any rate, he would try. There could, at least, be no harm in that. “Besides,” he mentally argued, “the want of sight is decidedly a less disadvantage than is the want of hearing.” In his opinion, *hearing* was everything, *seeing* comparatively nothing, in all matters appertaining to courtship.

Some years afterwards, during a conversation with a certain Lady R., Gale explicitly expressed his views respecting the relative importance of the senses of hearing and seeing in relation to affairs of the heart. His philosophy of the matter was curious and worth repeating. He was at the time collecting subscriptions towards the maintenance of the South Devon and Cornwall Institution for the Instruction and Employment of the Blind, and had occasion to call

on Lady R., who was then temporarily residing in the neighbourhood of Plymouth. Her ladyship, however, was not at home when he called; and on two subsequent visits, James found himself similarly disappointed, but on a fourth visit he was more successful. Sending in his card, Gale was desired to enter a room where Lady R. awaited his arrival.

On his entering the apartment, she, not perceiving his blindness, enquired of him whether he was any relation to the sightless founder of the institution for which he was collecting subscriptions. Gale, somewhat amused by the error into which he instinctively perceived his fair querist had fallen, readily replied that her assumption was correct; on which she expressed a strong desire to have a personal interview on the following morning with Mr. Gale, she having heard so much of him during her stay in Devonshire. James replied that as Mr. Gale had already called several times, and, moreover, had numerous pressing engagements, it would be very difficult for him to arrange for an interview at the time specified. On this, Lady R. said she would be delighted to see Mr. Gale whenever he could find leisure to visit her.

“Would it be convenient for your ladyship to have an interview with him *now*?” said Gale, with difficulty preserving his gravity. “He is not far distant, and I shall be most happy to convey to him any message which you may please to entrust to my care.”

"Oh, indeed! If such is the case, I shall be much pleased to see him at any time," was the reply.

"Here he is, my lady," exclaimed James, placing his hand upon his breast, and respectfully bowing, a sly wrinkle lurking in the corners of his mouth as he spoke.

Lady R. was taken somewhat aback on finding that she had been conversing with the real Simon Pure. Her self-possession, however, speedily returned.

"But surely you are not *blind*?" she enquired, in a tone which implied both doubt and curiosity.

"Indeed, I have reason to believe that I *am* blind," was the reply of her amused visitor. "At any rate, I have lost the use of my eyes."

Some conversation ensued, after which Lady R. enquired, "How is it, Mr. Gale, that you appear to know everything, just as if you still possessed your eyesight?"

"Why should I not?" returned Gale. "The shutters may be up, but that is no reason why the side-door should be closed also. Through these side-doors of mine I still retain the means of direct communication with the outside world. Most of my information is obtained by their means, and, being conveyed through them to the brain, is stored up within the workshop of the mind, where thought is ever as busy at work as if the windows had never been darkened."

More conversation of a similar character followed, in the course of which Mr. Gale made mention of his wife, which led Lady R. to exclaim, in a tone of astonishment—

“ You married ?”

“ Married ! yes. Why not ?” was Gale’s rejoinder. “ I know of no class of men more requiring the assistance of wives than the blind. The blind man wants some one to confide in and to give him correct ideas of what is going on around him. When a couple are united they become one, and in like manner one pair of eyes serves for two. I know of no better or more pleasant method than this of giving a blind man the use of his eyesight.”

“ But you were married before you became blind, were you not ?” enquired Lady R.

“ No, indeed, I was not,” was the reply. “ In fact, I never beheld my wife. I was blind when I commenced courting her.”

“ La !” how odd,” ejaculated her ladyship. “ However did you manage ?”

“ Manage ? Why, madam, the same as sighted people. *Sound* is of more service to them than is *sight* during the period of courtship. For instance, just glance at the spectacle of two lovers seated in the cool shade of a leafy tree. While the happy swain, in softest cadences, is talking of love, and declaring how deep and strong is the passion enter-

tained by him, the fair damsel to whom his vows are thus earnestly addressed, modestly keeps her gaze averted, watching, with apparently absorbing interest, the idle twirling of her thumbs, or amusing herself by incessantly smoothing the folds of her dress, or plucking numberless blades of grass. And when the swain has finished his impassioned discourse, does she glance, with a beaming smile on her features, at the radiant face of him whose voice has so charmed her? Not she, indeed. She looks quite another way, as if vainly endeavouring to discern some highly-interesting and all-absorbing object in the far off distance."

"Admirable, admirable!" exclaimed Lady R. "I see you know all about it."

"Yes," continued her sightless visitor; "there is more pleasure to be derived from sound than most persons are aware of. I have often followed a Plymouth fishwoman as she sang, in musical tones,"—and here the speaker imitated the sound he alluded to,—"*Fresh whiting here, fresh whiting, hook and line whiting.*" "But," he proceeded, "on meeting a Saltash woman, whose cracked and inharmonious voice more resembled the croaking of a raven than anything else, dismally groaning aloud, '*Fresh hake here, fresh hake,*' I would run down the street, round the corner—in fact, anywhere, so that my ears might be spared the jarring of her horrid discordance."

"Very good," remarked Gale's listener.

"Well, your ladyship," continued James, warming as he proceeded, "I dare say you have often noticed, when in company, that on being introduced to a very plain-looking lady, you found it difficult to avoid saying to yourself, 'What an unattractive person,' at the same time intuitively shrugging your shoulders and expressing your belief that you will never like her. Presently, however, you hear her relating, in sweet, melodious tones, some affecting incidents. The soft intonation of her voice acts as a charm on your feelings, and you think, after all, she is not so very plain-looking as you at first imagined. In fact, you repeat to yourself, 'What a nice woman that person is!' Now, on the other hand, take a pretty-looking female, whose fine forehead, artistically-pencilled eyebrows, and exquisitely small mouth, strike you as being wonderfully beautiful and prepossessing. You think no human creature can be fairer. When, however, you hear her speak in a harsh and haughty strain, using bitter, scornful words where reproaches were not called for, the much-prized loveliness appears to vanish, and an unfavourable impression, too frequently of a lasting character, is produced. But, my lady," said Gale, suddenly remembering the object of his visit, "I called on you respecting my Blind Institution."

"Never mind that just now," was the reply; "pray

go on with your remarks, for I perceive you have been a shrewd observer of human nature."

"Well, madam," said Gale, secretly pleased at having found an attentive listener, "I will give you another illustration of my argument. We will suppose that the gentleman visits his lady-love at her residence for the purpose of accompanying her during a pleasant walk. He is full of anticipation of the delights of an evening ramble with the idol of his heart, but by the time that the lady's toilette is complete, and the happy twain are about to emerge from the doorway, a drizzling shower of rain descends, and they are ruthlessly driven back to the house for shelter. Not caring to exchange their mutual vows in the hearing of witnesses, they retire to some unfrequented apartment, there to discourse, undisturbed, of the tender passion which animates them both. The time passes away unheeded, and the darkness which surrounds them is unobserved, until a gentle knock is heard at the door, which sound recalls them from the clouds, and reminds them that the earth is inhabited by others besides themselves. With a 'who is there?' and a 'come in,' the door is opened, and the maid-servant, begging pardon for her intrusion, asks whether she shall bring a light? 'Light? Oh no! is it really dark?' is the confused reply, as the maid demurely retires. In their entrancement the lovers had forgotten that they were surrounded

by darkness. Now, madam, had *sight* been an essential element of courtship, do you not think they would have had a light, by means of which every outline of their features could have been taken in at one rapturous glance? They would then have sat opposite one another, gazing at each other's good looks, instead of mutually whispering soft nonsense as they sat side by side."

At this, Lady R. laughed heartily, gaily clapped her hands, and said to Gale, "Oh, I see. You've been through it—you've been through it. Capital."

"And who has not, madam?" returned Gale. "It is the same all the world over. When the gentleman retires, his beloved one accompanies him to the street door. Soon there is a hasty glance around, a gentle pressure of the hand, and a low, whisper-like sound caused by a sympathetic and peculiar meeting of two pair of lips. Then comes the sound of retreating footsteps, and as they die away the maiden retires to muse on the soft and tender sayings which she has *heard*, rather than on the manly features which she has scarcely *seen*. From beginning to end, sound and sympathy are essential in most courtships. The beauty of the face may fade, but never the soft, musical pathos of the voice. If ever you wish to find a couple of lovers, go to some shady nook, or to some solitary lane, dark with over-hanging trees, and there you will find them."

Here Gale deemed he had said enough respecting the philosophy of courtship, and proceeded to discuss matters more closely connected with the Blind Institution founded by him, the result being considerably to his satisfaction, Lady R. at once promising both her subscription and recommendation.

James Gale having—as before stated—resolved to seek some one who would consent to be his helpmate in life, the next consideration was as to how he should find the means of supporting a wife and family. Here his father came to his assistance. On the subject being mentioned to the elder Mr. Gale, who was now in possession of a large and thriving manufacturing business, he at once willingly offered to provide the requisite means of support; but James Gale's love of independence and self-reliant spirit could not brook the idea of being dependent on any one, not even his own parents. Ultimately, it was arranged that James should enter into partnership with his father, and—blind as he was—undertake the practical management of the manufacturing business, to the formation of which Mr. Gale, senior, had so successfully devoted his energies.

Thus one of the impediments standing in the way of James Gale's realization of his fondest desire was effectually removed, but how was the other to be overcome? At first, it seemed as if the difficulty would prove unconquerable, yet success awaited

Gale's perseverance. It is not meet that in these pages we should raise the curtain which veils the sanctity of domestic life, or breathe to the world how James Gale wooed and won the heart of her who has so faithfully, so patiently, and so lovingly shared his fate ; with him hopefully climbing the rugged steeps of life ; with him cheerfully treading the path of honour and duty, and leading him to say, with Francis Huber, " Were I not blind, I should never know how truly one so afflicted could be loved." Suffice it to say that James Gale and the wife who has so nobly clung to her husband's side, even as the ivy clings to the stalwart oak, might each have said with Mrs. Sigourney :—

" Not for the summer hour alone,
When skies resplendent shine,
And youth and pleasure fill the throne,
Our hearts and hands we join.

" But for the stern and wintry days
Of sorrow, pain, and fear,
When heaven's wise discipline doth make
Our earthly journey drear."

CHAPTER VI.

“God of the dark and heavy deep!

The waves lie sleeping on the sands,
Till the fierce trumpet of the storm
Hath summoned up their slumbering bands;
Then the white sails are dashed like foam,
Or hurry, trembling o'er the seas,
Till, calmed by Thee, the sinking gale
Serenely breathes—departs in peace.”

Peabody.

“That thou may'st injure no man dove-like be,
And serpent-like that none may injure thee.”

Cowper.

THE MAN OF BUSINESS.

WITH James Gale's marriage began a new and promising epoch in the story of his career. The increasing extension of the business of which he had assumed the management necessitated its removal from Tavistock to Plymouth, the metropolis of the West. Here James found himself in an entirely new sphere. He had entered a world of ceaseless activity and unwearying exertion. The once frolic-

some youth, the philosophic student, had become, for the nonce, a pushing man of business, making his four senses effectually perform the work of five. James Gale certainly was not the man to allow the grass to grow under his feet. Having found something to do, he set about doing it with a vigour and hearty good will which really left little to be desired. It may appear to many somewhat strange that a blind man should be enabled to undertake successfully the principal management of a manufacturing business, in which an extensive use of chemicals rendered the possession of *eyes* a seemingly leading essential. Yet to those familiar with the history of the blind, there is nothing singular in the circumstance of a sightless person being entrusted with the superintendence of operations involving no little knowledge of practical chemistry and the working of certain valuable "trade secrets." It is wonderful to mark the extent to which the sense of touch can be developed, and thereby be made to produce apparently magical effects. A Newcastle journal recently published some curious details illustrative of this. According to that authority,* a blind man, bearing the time-honoured name of John Dryden, resides in South Shields, following "the avocations of cartman, coal merchant, horse dealer, pigeon

* *The Northern Daily Express.*

fancier, etc., with apparently nearly the same ease and agility as those not so unfortunate. He is to be seen any day at his coal dépôt, Temple Town, serving out pennyworths of coal to his numerous customers, or assisting in filling the coal carts. Incredible as it may appear, it is nevertheless true, that Dryden, after a waggon-load of coal is emptied into his dépôt, picks out the flints from among the coal with almost as much certainty as a man with eyesight. He can tell the names of his different horses with equally as much ease by simply feeling their heads. He is also remarkably clever at yoking and unloosing horses from the cart. As a pigeon fancier he is able to tell the different species of birds, and singular to say, can distinguish his own pigeons very easily." We might also cite the example of John Metcalfe, the blind road-constructor; William Kennedy, the blind mechanic; Nathaniel Price, the blind bookbinder; Count de Pagan, the blind engineer; and many others, whose histories tend to show that, great and deplorable as the deprivation of sight must inevitably prove to all subject to such a terrible infliction, its occurrence does not, by any means, of itself necessarily disqualify its victims from following the various business pursuits of life, however much it may sometimes temporarily delay the ultimate success of the sightless worker competing at a disadvantage with his sighted brother. As stated in a previous chapter, it is *ignorance* which

chiefly imparts to blindness such a fearful character. The *educated* man who becomes deprived of the blessings of sight, finds a hundred sources of compensation, and even increased usefulness on his part, and not unfrequently almost forgets his affliction.

From the moment that James Gale found himself living with a purpose, he became, as it were, a new man. Under his energetic management the manufacturing business of the Plymouth firm rapidly increased, and the elder Mr. Gale had no reason to regret the cause which led to his son entering into partnership with him. There was something wonderful in the energy displayed by James Gale. He was seldom at rest. Sometimes he would accompany the travellers in their journeys for the purpose of collecting accounts and orders. In this manner he contrived to visit a considerable portion of the United Kingdom, by which means he was enabled to *see*, as he expresses it, nearly all the leading places to which his attention had been directed. His invariable custom, before visiting any city or town, was to have all the different bills, memoranda, and other papers, arranged in the order in which he intended to call on his customers. By this means he occasionally found himself enabled to journey alone, but he seldom indulged in this practice.

In this way, Gale acquired a fresh stock of experience and knowledge, which subsequently stood him

in good stead. Few persons were able at first sight to perceive his loss of visual powers. He appeared more like a man suffering from slightly defective vision, rather than utter loss of sight, and several ludicrous anecdotes are related concerning the mistakes into which their ignorance of Gale's infirmity led many people, on their first becoming acquainted with him. Of course there were numerous circumstances under which his blindness could be instantaneously detected, but when he was travelling in a railway carriage or some other conveyance, it was scarcely observable.

In the course of his journeyings, James Gale once found himself staying at St. Heliers, in Jersey, where he was strongly urged by an old and intimate friend to avail himself of the unusual facilities offered by a forthcoming steamboat trip, for visiting St. Malo, on the coast of France. But, so far as Gale was personally concerned, an insuperable objection presented itself. The excursion was arranged to take place on a Sunday. In vain did Gale's friend strive to overcome the scruple entertained by him. He might as well have attempted to move a rock, for although not professedly a religious man, Gale naturally experienced much reluctance to participate in anything which appeared to involve aught like a desecration of a day which, from his earliest youth, he had been taught should be kept holy. At length, worn out by

the pressing and long-continued importunities with which he found himself assailed, Gale reluctantly consented to accompany his friend to the steam-packet, and remain with him until the moment of departure. As they were proceeding towards the pier, a lady presented a printed bill to each of the two friends. The bill was headed "Do you know where you are going?" and as his companion read the title to him, Gale's scruples returned with tenfold force, and he mentally vowed not to be tempted into joining the excursion. Arriving at the pier, and being positively assured that it would be some time before the vessel started, he allowed himself to be led on board, for the purpose of remaining in one of the cabins with his friend, until the moment of departure approached. Scarcely, however, had he found his way below deck, than he heard the heavy tramp and hoarse shouts of the sailors as they unloosened the various ropes which bound the steamer to the pier; then came a few short, sharp words of command, and before he could grope his way up the cabin stairs, the boat was proudly steaming out of the harbour, and rapidly steering in the direction of *la belle France*.

For a moment Gale felt completely overwhelmed. He had been duped into the perpetration of an act from which his conscience revolted, and he found himself becoming downcast and sick at heart. The day was beautifully fine, the sun shone brightly over-

head, not a speck dimmed the cloudless sky ; there was music on board, and the conversation of the passengers was both lively and interesting. Yet Gale could not shake off the feelings of gloom which so heavily oppressed him. In vain did his friend strive to rally him respecting his melancholy aspect ; Gale was not to be moved. As the harbour of St. Malo became more and more distinct in the distance, and the passengers commenced pointing out to each other its leading features, Gale's countenance began to brighten, and he seemed somewhat infected by the general excitement. At this moment the ticket-collectors made their appearance, and then James suddenly remembered that neither he nor his companion were possessed of tickets or passports. This was a dilemma, for it apparently involved the possibility of a prolonged detention at St. Malo, where, as at other French ports, the *gendarmerie* were extremely vigilant respecting the admission of strangers into France, in consequence of the recent attack made by Felice Orsini on the life of the Emperor. It transpired, however, that the excursion tickets were sold on board the vessel, and the man who had the sale of them explained to Gale that with every excursion ticket sold, a passport also would be issued. On this, Gale and his companion purchased the necessary tickets ; but when demanded their respective ages for the purpose of being in-

scribed on the passports, they at once became objects of suspicion to all on board, for Gale appeared at least ten years older than he asserted himself to be, while his companion seemed as many years younger than he really was.

Still, the passports were granted, and before long the excursionists found themselves within the shadow of the rocky peninsula, of which St. Malo forms the most important point. Here, surrounded by a formidable array of walls and bastions, the excursionists were compelled to undergo a close and searching scrutiny as each landed from the vessel, and Gale and his friend came in for an unusual share of attention ; but at length everything was managed satisfactorily, and the great bulk of the excursionists were soon speeding in the direction of the ground where the annual races were to be held, a circumstance with which Gale was unacquainted previous to starting. Gale resolutely declined to accompany them. He had been lured into taking part in the excursion, but nothing could induce him to go towards the spot where the races were being arranged. In vain was he told that horse-racing on Sundays was a customary feature of French holiday life, and that no one would blame him for acting on the principle which enjoins us "when at Rome to do as the Romans do." His character was too open and straightforward to admit of his availing himself of any such excuse or sub-

terfuge. Accordingly he passed the day in strolling about the town, visiting the ex-cathedral and churches, and sauntering along the pleasant walks afforded by the ramparts. Occasionally, too, he entered into "chaffing" conversation with the various policemen whom he continually met, by means of signs and pantomimic gestures, not being familiar with the French language. Several of these *rencontres* were of a most amusing character.

Sometimes he would rest himself by leaning on the rampart wall, and turn his sightless features in the direction where the broad green waters of the English Channel rippled and glittered in the bright sunshine. Little did he think that the spacious harbour which smiled below him had often, in the years gone by, been filled with French privateers which, during the dread times of war, swept, like a crowd of vultures, across the waves where the protecting flags of our war-vessels were too far off to protect the helpless merchantmen which formed the rich quarry of the French sailor-adventurers. Had he been familiar with the highways and byways of the town, he might possibly have ferretted out aged men, of grim and bronzed visage, who could have told him strange stories of adventurous smugglers and audacious privateers, such as would have shamed the boldest and most extravagant fictions of our novelists; but Gale, being a stranger in St. Malo, knew nothing

of all this, never even dreamed of it, but quietly mused on, dreaming of his English home, and the calm, peaceful quiet of an English Sabbath.

By and bye, the excursionists began hurriedly returning to the vessel ; but there was no trace of joy or exultation visible on their features—no sound of merriment in their tones. A sudden gloom seemed to have spread itself over everything and everybody. And there was plenty of reason, too, for in the very last race a favourite jockey had been cruelly dashed from his horse and instantaneously killed. When Gale heard of this sad incident, he felt more than ever satisfied with himself for having refused to be present at the races ; and, with his companion, hastened on board the steamer, which was expected to reach Jersey the same evening.

Very calm was the appearance of the sea as the excursionists left the fortifications of St. Malo far behind them. There was scarcely a speck on the bright horizon. All was peaceful, beautiful, and grand. But there was little gaiety observable among the passengers. A troubled air seemed to pervade their features, and with subdued voices they spoke of the frightful death of the ill-fated jockey. Gale could not *see* all this, but he could *feel* it, and more than once he fervently wished himself safe again at St. Heliers. Suddenly the wind began to freshen, and the sun rapidly disappeared behind huge masses

of black rolling cloud. The gentle ripples which during the day had sparkled so beautifully in the bright sunshine became replaced by bold foamy waves, which continually leaped in angry, sullen defiance at the strongly built sides of the vessel; and as they noticed the ominous change, the hearts of the passengers sank within them, for it was evident to all that a fierce tempest was rapidly approaching. The sailors too, seemed uneasy, and conversed with each other in low mysterious whispers. Still the captain courageously held on, and would not return to St. Malo, as several of the more timid passengers besought him.

At last, almost before they were aware of it, the miserable excursionists found themselves exposed to the full fury of the storm. Down it came, roaring with a voice of thunder. Fearful was the commotion occasioned thereby; every one seemed for a moment paralyzed with terror, after which heart-rending shrieks, agonized prayers, and despairing groans might be heard commingling frantically together in wild confusion. The eyes of the rash pleasure-seekers were continually blinded by the vivid flashes of lightning which every moment revealed with a lurid glare the frightful horrors of the scene, while their ears were repeatedly deafened with tremendous thunder peals, which perpetually reverberated through the spacious heavens. At one moment the vessel would

be soaring in the air on the lofty crest of some gigantic wave, and the next moment it would be helplessly rolling in the dark and yawning gulfs below. Then, after a momentary pause, the stout timbers of the boat would strain, bend, and quiver as if they were being violently torn from their fastenings, as if they could scarcely hold together; and then the unhappy creatures on board would grow pale with terror and dismay, for it seemed to them as if their last hour had arrived.

In the midst of this terrible scene, when every one felt that on the strength and coolness of those in charge of the vessel depended the safety both of boat and passengers, it was whispered about, in tones of dread, that the captain was *drunk*! Even so. At the very moment when everything appeared to depend upon his experience and skilful guidance, he had completely benumbed his reasoning faculties by having recourse to the bottle. The effect of the disastrous tidings on the horrified passengers was appalling. They now gave themselves up completely for lost. It was rumoured too, that the captain had actually lost a vessel on a previous occasion, in the identical neighbourhood where the boat was helplessly tossing and rolling,—not during a storm, or in the night, but in broad daylight, when the surface of the sea was unruffled by even the faintest breeze. At last the experienced eyes of the sailors detected a light in the

distance, and the circumstance becoming known, there was a general exclamation of relief, for there now appeared some faint hope of getting near enough to land to enable some effort at rescue being made. The illusion, however, was soon dispelled by the sailors recognising the light as one of those placed on the French coast, for the purpose of warning mariners against the dangerous rocks and shoals in the vicinity. The steamboat had, unknown to crew and passengers, been all the time beating about the French coast. Every attempt was now made to keep the vessel in the direction of Jersey, although the violence of the tempest seemed to preclude all possibility of safely passing either of the three passages by which St. Aubyn's Bay could alone be reached. The whole of their course was studded with dangerous rocks, to escape which, the utmost vigilance was necessary. At last, however, after escaping, as by a miracle, the numerous dangers which beset them, the exhausted passengers, passing the Little Road and anchoring within sight of Elizabeth Castle, reached the harbour from which they had departed merrily on the previous morning on their ill-starred excursion.

The friend who had been instrumental in enticing Gale to participate in the excursion, has frequently stated that our blind hero acted with great firmness during the whole of this disastrous voyage, and displayed wonderful presence of mind, although he was

greatly troubled with thoughts of the wife and home he had left behind in sunny Devonshire. Little dreamed his fond and devoted wife how at the very moment when in the pulpits of Plymouth's places of Divine worship, the servants of the Almighty were returning grateful thanks for the manifold mercies vouchsafed to them and their flocks during the week, her husband was battling for his life on the stormy waves, with only the narrow thickness of a plank intervening between him and utter destruction. Gale thought of this, and felt bitterly humiliated at the contrast pictured by his imagination ; but he refused to yield to despair. "What must be, will be," he reasoned as of old, and as he did so, the old spirit of fearlessness returned to him, so that he betrayed no indication of alarm or despondency. Very strange was it to behold the sightless man sitting apparently calm and unmoved amid the crowd of terrified and shrinking passengers ; and there were some who, in the very midst of the panic, nearly forgot their fears as they gazed on the courageous and stout-hearted James Gale. Very glad, however, was he when he found himself again on the pier at St. Heliers. It had been a narrow escape, and there were not many who would have cared to incur the peril a second time.

On another occasion, being detained at Newport, in Wales, Mr. Gale found himself prevented from keeping an engagement made by him at Cardiff. He was

much annoyed at the disappointment, but a few days afterwards he learned that his unexpected detention had been extremely providential; the *Avon* steamer, in which he was to have crossed from Cardiff to Bristol, a passage by no means long or perilous, having been sunk during the voyage.

The various journeys made by him through the United Kingdom were of considerable service to Mr. Gale. They tended to divert his ever busy mind, and prevent it from becoming too closely occupied with the various scientific studies of which he was so passionately fond. Besides, as in the case of Lieutenant Holman, the blind traveller, repeated changes of scene furnished him with more frequent opportunities for observing men and manners, almost as closely and accurately—in some instances, more so—as if he possessed his powers of sight. With Beaumont and Fletcher, James Gale could truly say of his love of travel, that, by his experience, he found:—

“ It draws the grossness off the understanding,
And renders active and industrious spirits.
He that knows most men’s manners must of necessity
Best know his own, and mend those, by example.
’Tis a dull thing to travel like a mill horse,
Still in the place he was born in, lamed and blinded;
Living at home is like it. Pure and strong spirits,
That, like the fire, still covet to fly upward,

And to give fire, as well as take it, eased up and mew'd
here—

I mean at home, like lusty-mettled horses,
Only tied up in stables to please their masters,
Beat out their fiery lives in their own litters."

The ready wit and love of humour which formed such a conspicuous feature in Mr. Gale's character rendered him an ever-welcome visitor at the various commercial hotels and inns, at which he and his travellers found it necessary to make their stay, and led to his being repeatedly invited to parties of a convivial description, where laughter, fun, and frolic usually formed the order of the evening. He found it difficult to resist the temptations thus placed before him, the more so that his presence was generally hailed with a cordiality the more pleasant because of its evident sincerity. Sometimes, however, the harmony of the assembly would be rudely interrupted by the ill manners of some consequential individual, of whom there are unluckily too many to be found among the commercial fraternity, who, wishing to give the company a due sense of his imaginary importance, would begin deprecating the abilities of those present, at the same time extolling in braggart terms, those possessed by himself. One such worthy was characteristically extinguished by Gale. The man had been boasting to his sightless hearer that he could do this and do that, to the great amusement

of the company, when Gale suddenly laid a wager that he would carry the boaster, in an incredibly short period of time, through the leading streets, the starting-point to be the very centre of the crowded and busy town. Eager to take advantage of what he deemed to be rashness on Gale's part, the boaster at once accepted the wager; and the two, accompanied by a number of friends, proceeded to the starting-place, where they speedily became the observed of all observers.

"Are you ready?" enquired Gale's opponent, smiling as if already secure of triumph.

"Perfectly so," was the cool reply.

"Well, then, let me get on your back," and as he spoke, the man winked knowingly at the by-standers.

"Stop a moment," said Gale. "First take off your coat."

The man, on hearing this unexpected demand, looked somewhat perplexed, but thinking it a *ruse* on the part of Gale to avoid fulfilling the wager, he at length complied with the seemingly odd request.

"Now off with your waistcoat," demanded Gale.

"Nonsense," was the reply; "I'll do nothing of the kind."

Gale, however, was inexorable, and the second garment was taken off.

"Are you ready now?" was asked of Gale.

"Certainly not; off with your unmentionables,"

and a roar of laughter burst from the crowd as they beheld the perplexed gaze of the coatless opponent of Gale.

"Surely, you do not want to carry me in this absurd plight. It is perfectly ridiculous," he remonstrated.

"That is your look-out," was Gale's reply. "Although I consented to carry you, I never agreed to carry your clothes also."

The features of the hapless victim became scarlet with rage and vexation ; and, amid the hearty laughter of Gale and his friends, he hastily disappeared from the scene.

Another boaster was vanquished even yet more completely. In true Bombastes-Furioso strain he was bragging of his great strength, the power of his flexors, and of his matchless pugilistic skill. Indeed, were his assertions to be implicitly credited, the columns of *Bell's Life* had never contained the name of any member of the prize ring who was fit to be deemed his equal. Gale calmly listened to the loud self-eulogiums of the vain-glorious votary of the fistic art, and when the torrent of self-praise had somewhat abated, he quietly said :—

"Now, look here ; it is all very well for you to talk in this manner, but were you and I to be standing on a single sheet of the *Times* newspaper, you would not be able to touch me."

“Ah ! you are very clever,” was the reply ; “ but I am not quite so simple as you think. You would tie my hands, I suppose.”

“ Nothing of the kind ; your hands and arms shall be entirely free.”

Thinking, from Gale's strongly-built appearance, that his sightless adversary really intended a trial of strength, the boaster called on him to make good his words. Gale, nothing loth, took up a sheet of the *Times*, and, opening it, spread it across the threshold of the doorway leading to the room. Telling his adversary to stand in the passage, he then suddenly closed the door and locked it, his opponent being left outside. This being done, half of the newspaper sheet remained in the room and half outside ; but the locked door prevented the two adversaries from touching each other, although both were standing on the same sheet of paper. Of course the would-be vanquisher was at once subdued.

We reproduce these incidents merely for the purpose of showing the imperturbable good-humour of Gale's disposition, and the quiet self-possession which has enabled him to overcome many little annoyances to which the afflicted are sometimes subjected at the hands of the thoughtless and inconsiderate. This system of turning the laugh against those who made light of his infirmity was surely infinitely better than to be sullenly brooding over every real or

imaginary slight; or to become misanthropical in tastes and habits, because of the foolish and ill-judged behaviour of a few. In this Gale showed himself a true philosopher. His motto was to take every trouble as easily as possible, and it would be well for us if some of his sighted brethren could learn to profit by his example in this respect; for, as Hazlitt truly observed, "Of all virtues, magnanimity is the rarest."

Shortly after Mr. Gale became a resident in Plymouth, he was elected one of the guardians of the poor in that town; and notwithstanding the multifarious occupations in which he found himself engaged, he contrived to procure sufficient time to discharge the various duties required of him. To his honour, he was always to be found on the side of every measure having for its object the amelioration of the condition of the poor, and preserving them from unnecessary degradation. Amongst other things, he showed himself inflexibly opposed to the too prevalent system of allowing the workhouse girls to enter the service of publicans, a custom which experience has shown to be fraught with pernicious results. "No guardian," he argued, "would like to allow his own daughter to take service in a public-house, where she was certain to be exposed to every possible temptation and danger, and why should he act otherwise in the case of the young girls with the guardianship of

whom he was entrusted?" In these views, Mr. Gale was supported by many of the guardians, including several who were themselves publicans.

It was about this time that Mr. Gale took a step which has unquestionably exercised a beneficial influence on his subsequent career. Talking with several ladies on the subject of total abstinence, one of them told him that if he would sign the pledge, she and the others would sign also. This set Gale seriously thinking on the powerful influence of example. He had known, within the range of his own experience, several sad instances of the degrading power of intemperance. He was acquainted—and who is not?—with homes which had become cheerless and desolate through its fatal instrumentality, with hearts broken through the unkindness and neglect of its votaries, with the shame and suffering inflicted on the innocent by its baneful spell. He remembered, too, the case of a female whom he knew, a clergyman's wife, who, despite her education, refined associations, and elevated position, had fallen a victim to this most debasing of all vices. And as James Gale mused on these things, he instinctively felt how deep was the responsibility which rested upon him, how great would be his error if, by want of some little self-denial on his part, the laughing maidens thus before him were not encouraged in their wise and brave resolves to abstain from the use of those drinks

which ever form a source of temptation to those who have not learned to withstand their blandishments.

His mind was soon made up. There was to be a temperance meeting in Plymouth that very evening. Thither went James Gale. Thither also went the ladies who had challenged him to become a teetotaller. Handel Cossham; Mr. W. Saunders, of the *Western Morning News*; Noah Bailey, a well-known temperance advocate, and others, were amongst the speakers; and as Gale listened to the various arguments adduced by them, and heard the thrilling story of those rescued from the gulfs of drunkenness, of homes rendered bright and happy by the influence of temperance, of lowly hearts that heroically endured the social martyrdom of ridicule, scorn, and hate, rather than, even for a single instant, forego the principle to which they had pledged their adherence—his soul seemed to swell within him, and the fires of enthusiasm became kindled within his breast, until, unable any longer to repress his feelings, he rose in the very midst of the crowded assemblage, and stated aloud that even had he not that evening come there for the purpose of signing the temperance pledge, the facts and arguments he had there heard would have convinced him of the desirability, nay, the necessity, for so doing.

That evening James Gale joined the ranks of the temperance party. It was a sore trial at first. He had continually to fight with social customs which

seem to have become part and parcel of English life. Nor was this all. His old friends and associates perpetually teased him respecting his new-formed resolutions, of the permanency of which they expressed grave doubts. No, no ! James Gale would never remain a teetotaller ; he was too jolly a fellow for that. He could not do without them, nor they without him. But for once the prophets were mistaken. James Gale remained firm, and to this day the cause of teetotalism has found in him one of its firmest friends and supporters.

In his capacity of guardian of the Plymouth poor, he lost no opportunity of bringing the subject of intemperance, and the evils arising therefrom, under the notice of his fellow-officials. This sometimes exposed him to much misrepresentation on the part of those to whom the doctrines professed by total abstainers were distasteful. In 1864, while endeavouring to procure the adhesion of the Plymouth guardians to the views entertained by the "United Kingdom Alliance for the Suppression of Traffic in Intoxicating Liquors," he drew attention to the significant fact that during the previous five years, not a single teetotaller had been found in the prisons of Plymouth, Dartmoor, or Stonehouse. He also showed how the richest county in England possessed most public-houses, paupers, and criminals ; while the poorest—Cornwall—possessed the fewest of either

beershops or criminals ; thereby proving that poverty was not necessarily a cause of intemperance or crime, although crime and poverty were generally the results of intemperance.

From the moment that Mr. Gale proclaimed his adhesion to the temperance banner, he proved no inefficient recruit. He was ever ready to take his share of the conflict. And what spectacle can be more grand, more significant, more hopeful, than that of a true and brave-hearted sightless man, forgetting his own dire affliction in the great and glorious struggle to rescue the countless victims of that terrible vice, to the baneful influence of which so much of our national poverty, immorality, crime, and suffering, is directly attributable ? The amount of social and moral good effected through the instrumentality of such organizations as the National Temperance League is incalculable. It has furnished the leaven with which, sooner or later, the whole social fabric of this country must become permeated ; and the more that the principles advocated by our temperance reformers, the great mass of whom belong to the working classes, are acted upon, the greater and more enduring will become the amount of prosperity and happiness possessed by the people ; and more noble and grand the example bequeathed by them for the emulation of posterity.

CHAPTER VII.

“Oh! if the selfish knew how much they lost,
What would they not endeavour, not endure,
To imitate, as far as in them lay,
Him who his wisdom and power employs
In making others happy.”

Cowper.

“Those who have the rarest joy, know joy’s true measure;
They who most suffer, value suffering’s pause;
They who but seldom taste the simplest pleasure,
Kneel oftenest to the Giver and the Cause.”

The Hon. Mrs. Norton.

THE BLIND HELPING THE BLIND.

OF the five senses with which the Almighty, in His infinite wisdom, has endowed man, that of sight appears the most important; for, as it has been truly observed, “there is none of the senses which affords such an endless variety of perceptions, such a fund of materials for the mind, the imagination to work upon,” as that of which our sightless brethren are unfortunately deprived. And yet, as mentioned in a preceding chapter, as a rule, the blind feel their affliction far less than the deaf do theirs. This is

well illustrated by the leading characteristics of the two classes. The blind are generally animated and cheerful, both in conversation and demeanour, while the deaf are shy, exhibiting a tinge of melancholy, and often morose and suspicious in disposition. "Take," says Dr. Watson, "a boy, it may be, of nine or ten years of age, who has never seen the light, and you will find him conversable, and ready to give long narratives of past occurrences, etc. Place by his side a boy of the same age, who has had the misfortune to be born deaf, and observe the contrast. The latter is insensible to all you say; he smiles, perhaps, and his countenance is brightened by the beams of 'holy light;' he enjoys the face of Nature, nay, reads with attention your features, and, by sympathy, reflects your smile or frown. But he remains mute; he gives no account of past experience or future hope." He forms one of the hermits of society. Everything he beholds seems part of a dull and lifeless panorama, divested of all interest to him by reason of his knowing little or nothing of the scenes represented. Let him enter a place of worship or a lecture room, and what ideas can he possibly glean from beholding the mere expression of a speaker's features, the movement of his lips, or the various attitudes which his limbs may assume? It is, unfortunately, but too true that "the deaf are more separated from those that hear, than are the blind

from those that see;" for, as Dr. Reid declares, "sight discovers almost nothing that the blind cannot comprehend;" but the power of sight cannot enable a deaf man—who has never enjoyed the faculty of hearing—to comprehend the strange and mysterious phenomena of sound.

Marvellous indeed is the structure of the ear, and the effects produced by it when in a state of health. "It is," says one of our most eminent aurists, "a wonderful organ, of which those who know most have still very much indeed to learn. There is much in it to excite our wonder; but, above all, we cannot but stand in amazement before the question, how is it that the motion of the air, the vibration of the membrane, the trembling of the fluid, should impress us with the feeling of a *sound*; should hold us rapt as music does, or thrill us with ecstasy in the tones of a voice we love? That is the great mystery of all the senses. We cannot penetrate it yet; but we can feel, and ought to feel, how wonderful it makes the world. That which seems mere motion in the ear, and in the nerve, turns into joy or sorrow in the soul; it is the source and instrument of aspiration, the vehicle of prayer. If it is all this to us, what must it be to God, who made it, and knows it perfectly?"* But the deaf, those who have never heard,

* *People's Magazine. January, 1868.*

know nothing of this. With all the advantages of seeing, they, "unless they have a great aptitude for such occupations as employ the eye and the hand, are far more narrowed in their circle of studies, and much more solitary than the blind." The numerous difficulties which beset the path of Dr. John Kitto—himself a Devonshire man, he being a native of Plymouth—in the pursuit of knowledge, were rendered arduous to a greater degree by reason of his deafness, than were those experienced in consequence of his blindness, by James Gale, and other blind men who have risen.

Yet, strangely enough, a far larger per-centage of deaf than of blind persons are enabled to obtain their own livelihood, thereby becoming less dependent on the assistance of relatives and friends. The deprivation of hearing may prevent a deaf person from gaining knowledge and instruction by means of spoken language, but it does not necessarily preclude his obtaining, by the use of his eyes, an accurate knowledge of the various operations or technicalities in a given trade. He may be unacquainted with the names of the different tools, but he will contrive without difficulty, on being shown, to select the right ones, and use them in a workmanlike manner. Of course, he will inevitably labour under immense disadvantages compared with the facilities possessed by workmen who are enabled to hear as well as see, but,

so far as learning and practising a trade are concerned, his position will be—generally speaking—superior to that of the blind man, unless proper provision be made for the efficient instruction of the latter. And here it is that the present condition of large numbers of our poorer blind is so deplorable. They are utterly precluded, by reason of the small number of “blind schools,” in which really efficient instruction is imparted, from acquiring the special kind of technical knowledge and experience requisite to enable them to gain a livelihood, by the adoption of any particular handicraft, save a few in which little instruction is required, such as basket-making and the like.

Moreover, it must be remembered that, although in some points the condition of the blind is less deplorable than that of the utterly deaf, yet their loss is in itself a sad and grievous deprivation. As the Rev. E. A. Telfer once touchingly observed:—“The blind from birth have, perhaps, only a small idea of the great loss they have sustained; but it is most melancholy to see the distress which those who have been deprived of sight suffer under. For them the sun, the moon, and the stars no longer shine, and no longer is the beautiful landscape, before which others stand entranced, spread out before them.” Again:—“I know that it requires something more than mere human aid to render the darkness of the blind tolerable; but still I believe it is possible to

ameliorate their condition by putting into the hands of the afflicted a knowledge of handicrafts, of reading, and of those matters which appertain to the peace of the soul, and thus, by supplying food to the mind, and skill to the hands, of mitigating the severity of the affliction." It is not mere pity which the blind require, but practical help.

It is now less than eighty years since the first attempt was made in this country for the purpose of remedying this serious deficiency. In 1791, a number of Liverpool merchants, having heard of the success of an institution, having for its object the education of the blind, founded a few years previously in Paris, started a similar institution in their own town. Here they made arrangements for teaching a certain number of poor people deprived of sight, various handicrafts or trades, by means of which they would be enabled to earn their livelihood. In 1793, a second institution was commenced in Edinburgh; then came a third in Bristol; London following, in 1799, with a fourth, that in St. George's Fields. The Glasgow Blind Asylum was founded in 1828; that in Aberdeen was not started until 1843. Most of the schools and asylums for the blind in this country are of recent date; but largely as they have increased in number, they are too few compared with the requirements of the thirty thousand blind persons at present living in the kingdom. The funds and resources of

several institutions are also badly economised, if not actually mismanaged, thereby yet further limiting the amount of actual advantage received by the blind, as a body, from the existence of these places. How sadly increased means of instruction and employment for the blind are needed in this country, may be inferred from the Rev. B. G. Johns' statement, that, "if statistics, always treacherous in matters of age, can be trusted, it seems that out of the twenty thousand blind persons in England, about one-seventh are under twenty years of age, a large number of whom must be of the right age to enter a blind school; yet of these only seven hundred and sixty* are now actually under instruction, and the thirteen existing schools provide accommodation only for about a thousand pupils. And be it remembered too, that blindness is chiefly prevalent among the poor; that where impure air and scanty food are found, where sanitary neglect prepares the way for fever and disease, there opthalmia gains its most fatal victories, crushing with irresistible force the bright and cheerful light from the eyes of its pale and shivering victims."

When Mr. Gale took up his residence in Plymouth he found that no provision had been made in that part of the country for the education of the blind.

* According to the Census of 1861.

There was an Institution for the Blind at Exeter, but although admirably managed, it was too far removed from Plymouth and the western portions of Devonshire to be generally available by the sightless residents therein ; while so far as the Cornish blind were concerned, Exeter might have been in another hemisphere for anything they knew to the contrary. This fact made a powerful impression on Gale's mind, and he resolved to do something towards removing the charge of neglect from his native county. Sympathy for the affliction of others, especially of those who, like themselves, are deprived of sight, forms a peculiar and pleasing characteristic of the blind, and one to which we owe several of the most useful institutions in this country. Dr. Blacklock and David Millar, both of whom were blind, aided in starting and fostering the asylum at Edinburgh ; the Norwich institution was projected, we believe, by Mr. Tawell, a blind gentleman. Mr. Leitch, the founder of the Glasgow asylum ; Mr. Day, who bequeathed £100,000 for the use of the blind ; and various other benefactors of the sightless, were each deprived of the pleasures of vision. Miss Gilbert, the kind-hearted daughter of the Bishop of Chichester, who, some twelve or fourteen years since, founded the well-known institution in the Euston Road, London, is also a sufferer from blindness. Similar examples might be cited in France, Germany, America, and other countries.

At first, Mr. Gale did not clearly understand what course he should pursue. *Something* must be done, but *what*? His first thought was to open a school at his own residence, where he could employ a portion of his leisure time in instructing a few of the poorer blind residents of the town; but, on his intention becoming known to his friends, he encountered so much opposition from them (they perceiving, more forcibly than he did, how it would seriously interfere with his domestic arrangements), that he was compelled to forego his cherished plans. Mr. Gale, however, was not to be discouraged when he had resolved on doing anything. He was determined to alleviate, however slightly, the condition of his sightless brethren, and at last he decided upon personally canvassing the leading inhabitants of Plymouth, Devonport and Stonehouse, for subscriptions, at the same time making an effort to ascertain the number of persons afflicted with blindness resident in those places. This was really a formidable undertaking for an individual deprived of sight, and having the greater portion of his time occupied with the cares and anxieties of business. Still, Mr. Gale's indomitable perseverance enabled him to overcome all difficulties, although many persons would have felt themselves disheartened when encountering the numerous obstacles which at times impeded his progress. Mortifications and disappointments were

plentiful, one or two instances of which may be here mentioned. In the course of his visits, Mr. Gale called at a certain house, and, sending in his card, received a reply that the gentleman whose assistance he had solicited was a supporter of the Blind Institution at Exeter. The next week, being in the neighbourhood, he unintentionally called at the house a second time. The door being opened, he told the servant how the mistake had occurred, apologised, and then went away. A few days afterwards, as ill luck would have it, he unwittingly went to the house for the *third* time, although he was not aware of the fact until the now familiar tones of the bell unexpectedly saluted his ears. Finding himself "in for it again," Mr. Gale determined to put a bold face on the matter, instead of beating a speedy retreat; so when the door suddenly opened he found himself standing, subscription book in hand, for the third time within three weeks, in presence of the astounded servant, who appeared to consider him a veritable Monsieur Tonson. The usual explanation ensued, and Mr. Gale turned to depart, when the gentleman, who had accidentally overheard the conversation at the door, called him in, and, having listened attentively to what the sightless advocate of the blind had to say, announced his intention of becoming an annual subscriber to the projected school. "It is an ill wind that blows nobody good."

On another occasion, visiting a lady, he was mistaken for a vendor of quack medicines, and, before he could utter a word, was told that "they did not take in bills at the front door," on which, politely begging pardon, he said "he would most willingly proceed a mile to the back door, if by so doing he could assist his project." Struck by his answer, the lady desired some account of his proposed school, and, after listening to his explanations, became an annual subscriber to the same. In another case, a sapient clergyman, thinking Mr. Gale was soliciting personal assistance, told him that "if he would bring certificates from some respectable tradesman or medical practitioner, he might be inclined to do something for him, but that under present circumstances it was impossible." At another time Gale was asked whether he ever slept, or closed his eyes. This was to him a very odd question, yet it was put in perfect sincerity and good faith, for, even among educated people, there yet lurks a trace of the old popular error that the blind have no need of sleep. This reminds us of an anecdote related by Mr. Gale in one of his unpublished works. Some years ago, a lady was walking round a blind school, for the purpose of inspecting the sightless pupils at their work. Suddenly turning to the manager, she asked, in the hearing of all,—

"Poor things! do they ever speak?"

The effect was instantaneous, and the gentleman

thus addressed was glad to get his fair questioner out of the room as soon as possible. They had scarcely passed through the door than an irresistible burst of laughter from the "poor things," testified their appreciation of the joke. "Poor things! do they ever speak?" for a long time formed a by-word in that particular school.

None of these unpleasant *rencontres*, however, deterred Mr. Gale from prosecuting the enterprise he had commenced. This was in the spring of 1859. Taking for his motto "Onward and upward," he worked on steadily, through sunshine and rain, through heat and cold, oftentimes returning late at night drenched to the very skin and worn out with fatigue. Often did he feel stricken to the innermost core by the numerous rebuffs experienced by him. Night after night he lay awake, the tears ever starting from his sightless eyes, as he sadly meditated over the apathy and coldness with which his scheme was received by many who possessed the power, but lacked the will, to assist it forward. There were a few, however, whose kindly sympathy encouraged Mr. Gale to persevere. Amongst these was the Rev. Dr. Tancock, Vicar of Tavistock, to whom he first confided his intention, and who warmly urged him on, remaining to the present day one of the most active supporters of the institution subsequently arising from Gale's exertions. At last sufficient funds

having been obtained with which to make a start. Mr. Gale announced his intention of opening a school for the blind at 15, Clarendon Place, Citadel Road, Plymouth, where instruction was to be afforded by him gratuitously in reading, cyphering, basket-making, etc. ; but the scheme was developing itself so rapidly as to exceed Mr. Gale's unaided powers of management, unless he devoted himself entirely to it. He found that a regular institution would be required, there being about eighty blind persons in Plymouth, Stonehouse, and Devonport alone, of whom at least between thirty and forty would be greatly benefitted by the establishment of a proper institution. Here was a dilemma ; but having proceeded thus far, Mr. Gale found it impossible to recede. He must keep on in the path he had chosen, but it was impossible to do so without assistance. Thereupon he endeavoured to procure the co-operation of several of the leading ministers and gentlemen resident in Plymouth and its neighbourhood. Some of these declined, not believing in the ultimate success of the schools ; others were too timid, and wished to wait until they could ascertain how things were likely to turn out. One individual, whose assistance Mr. Gale particularly relied upon obtaining, contemptuously pooh-poohed the whole matter, advising him to relinquish his apparently futile scheme, and leave it to be carried out by others. But Mr. Gale knew that

“what was everybody’s business was nobody’s business,” and declined receding in the slightest. Fortunately for the success of the future institution, there were several who, like the kind-hearted vicar of Tavistock, proved themselves staunch supporters of Mr. Gale, and to the earnest and self-denying assistance afforded by these, much of our hero’s subsequent success is certainly attributable. Among the earliest of those who thus generously came to the rescue were Major McKellor, the Rev. G. D. Doudney, G. W. Soltan, Esq., J.P.,* J. Trego, Esq., and Mr. H. Luscombe. Mr. Isaac Latimer, of the *Plymouth and Devonport Weekly Journal*, and now proprietor and editor of the *Western Daily Mercury*, also rendered valuable assistance to Mr. Gale, who has repeatedly acknowledged his deep sense of the obligations incurred by him for the help afforded by Mr. Latimer, whose paper frequently advocated Mr. Gale’s plan, and assisted in evoking public sympathy in its favour. The other local papers also regarded the project with approval. During the summer Mr. Gale, assisted by Mr. Thomas Creber, who was also a sufferer from blindness, called a meeting in Devonport, at which upwards of fifty blind persons attended, the result being the formation of a committee for the purpose

* This gentleman has lately presented a bronze bust of Mr. Gale, to the South Devon and Cornwall Institution.

of establishing a blind institution in that town. Mr. Gale, however, wished to have the institution in Plymouth, as being the largest and most important place. Therefore, while wishing all success to the proposed Devonport Institution, he persevered in his efforts to found a similar one in Plymouth. In November a number of gentlemen resident in the metropolis of the West and its vicinity, constituted themselves into a committee, and decided upon hiring a portion of the old Plymouth workhouse, where—the services of a blind teacher, trained in the Exeter Institution, having been hired—a blind school was formally opened in January, 1860. Although the chief burden of the work had now become transferred from him, Mr. Gale volunteered to continue the arduous labour of collecting subscriptions, and his offer, as a matter of course, was readily accepted. After the opening of the school, availing himself of the facilities mentioned in the preceding chapter, Mr. Gale visited the various institutions in Exeter, Bristol, Birmingham, London, Liverpool, and elsewhere, for the purpose of gathering all available information as to the best system of management to be adopted, and the qualifications necessary for matrons and teachers.

Twelve months after the opening of the Plymouth “Institution for the Instruction and Employment of the Blind,” as the school founded by Mr. Gale was

modestly designated, the first anniversary meeting took place, at which the Rev. H. Graves, M.A., Vicar of Charles, presided. At this meeting the title of the association was changed to one of a more pretentious and comprehensive character:—"The South Devon and Cornwall Institution for the Education and Employment of the Blind;" the President being the Earl of Morley, and Lord Valletort, M.P., and R. P. Collier, M.P., being Vice-Presidents. Sermons, in aid of the association, were preached in various places of worship, the liberal collections at which afforded conclusive testimony as to the deep interest which Mr. Gale's friends and neighbours had begun to take in the movement inaugurated by him. The Rev. J. W. Gowering, of Kennington, London, a blind clergyman, and editor of the Bible printed on Lucas's system, also preached sermons on behalf of the institution, both at St. Andrew's Church and Charles Church. Various clergymen and ministers in the neighbourhood expressed hearty sympathy with the movement, and thus the work originated by the lone blind philanthropist began to display signs of widely spread and increasing usefulness, teaching us the instructive lesson that we ought never to despise or disregard apparently small things—that the mighty oak, which proudly towers over the fertile plain, was originally a seemingly insignificant acorn.

In 1862, the institution was removed from the old

workhouse to its present locality in Coburg Street, where more suitable premises had been secured.

The late Prince Consort,—who, familiar with the interesting Diary of his Royal Wife, must have often thought with feelings of pleasure of their excursion along the Devonshire coast in 1846, and how they marked the beauties of Babbicombe Bay ; gazed admiringly at “ beautiful Dartmouth, lovely with its wooded rocks, and church, and castle at the entrance,” of which the Queen remarks :—“ It puts me much in mind of the beautiful Rhine and its noble ruined strongholds, and the Lurlei ;” and glanced at Mount Edgecumbe, over “ the splendid harbour of Plymouth,” “ with its beautiful trees, including pines, growing down into the water, and looking more lovely than ever,”—sent a letter to the committee, announcing his intention of patronizing the Plymouth Institution. On the receipt of this letter by the committee, Mr. Gale visited the gentleman who had formerly thrown cold water on his plans, but who had since become one of his adherents, and expressed his intention of soliciting the assistance of the Prince. He was met with a strong expression of incredulity as to the probability of success, on which he triumphantly produced the letter that had been received. This of course settled the question. Some little time after this incident, the proprietor of the premises in Coburg Street dying, bequeathed them unreservedly for the

purposes of the institution ; and one of the lady subscribers having left a legacy of £200, the committee began enlarging the school, with the view of increasing its utility. To meet the increased expenditure thus occasioned, a bazaar and public meeting were held, the proceeds of which more than sufficed to defray all the expenses connected with the alterations. In April of the same year, Mr. Gale, attended by the Rev. E. A. Telfer, a talented Wesleyan minister, now labouring with much success among the poor of East London, and whom we have previously alluded to, visited Truro, in Cornwall, where they received a most encouraging reception, and found the claims of the Blind Institution represented by them duly appreciated. Some time after the death of the Prince Consort, His Royal Highness the Prince of Wales signified his intention of taking his lamented father's place as patron of the institution, at the same time forwarding a donation of twenty-five guineas. The treasurer's balance-sheet for 1863 showed that, during the preceding twelve months, no less than £1004 14s. 5d. had been received on behalf of the institution. In 1865 several of the inmates of the institution, in compliance with a special invitation, forwarded specimens of their handiwork in basket-making and matting to the Plymouth Industrial Exhibition, where they received much attention, a first-class silver medal being awarded to the institu-

tion, also a money prize for distribution among the exhibitors. At the date of the last report, there were twenty-seven blind persons receiving instruction or employment in the asylum, of whom twenty were lodged and maintained in the house, and seven were non-residents ; of the inmates, fourteen were males, and six were females. The principle on which the institution is based differs from that of most others in this country. Some of the institutions take pupils at a given age only, ultimately, after teaching them a trade, leaving them to shift for themselves. The Plymouth institution was based on the conviction that something more was wanted, that there should be no restriction as to age, and that the institution itself should endeavour to furnish constant and remunerative employment for the sightless workers. The Blind Institution in the Euston Road, London, is founded on this principle. It is not charity which is required, but the means of obtaining a livelihood, by the exercise of honest industry. The adult who becomes deprived of sight, either from accident or disease, frequently finds himself as incapable of following a trade as is the untrained lad who has been blind from birth. To restrict the advantages of industrial education to those of tender age, is manifestly to exclude very many of the poorer blind from the power of procuring a respectable livelihood. Not less important is the principle of rendering the institution

a mart for articles manufactured by the sightless workers. By this means they are spared many inconveniences; and, in not a few instances, being supplied with materials, are enabled to pursue their avocations at home, those preferring it taking up their abode in the institution itself.

One instance of Mr. Gale's deep interest in the comfort of his blind *protégés* deserves to be recorded. On March the 10th, 1862, when, in common with the rest of the kingdom, the inhabitants of Plymouth were celebrating the marriage of the Prince of Wales to the Princess Alexandra, Mr. Gale, who lived in one of the leading thoroughfares, contemplated making preparations for illuminating his premises; but finding that no steps had been taken for enabling the blind people of Plymouth to participate in the festive rejoicings, he declined giving the order for the illumination—instead thereof, furnishing a bountiful repast, at his own expense, to the inmates of the institution. On leaving Plymouth, for the purpose of taking up his residence in London, Mr. Gale was necessarily compelled to take a less active part in the working of the institution, but his name is still retained in the list of the managing committee.

Mr. Gale's arrival in London was not marked by any cessation of his labours on behalf of his sightless brethren. He had merely exchanged his sphere of action. Becoming more closely intimate with those

taking some degree of interest in the welfare of the metropolitan blind, he soon found himself connected with the London Society for Teaching the Blind to Read, and for Training them in Industrial Occupations, Avenue Road, St. John's Wood, of which association he was elected one of the executive committee. Here, in conjunction with his old friend, the Rev. J. W. Gowering, together with Major-General Nuttall, and H. Wright, Esq., who collectively formed the Embossing Committee, Mr. Gale found himself possessed of an opportunity for prosecuting his cherished scheme of assisting in promoting the literature of the blind, which at present is of a most restricted character; the existence of several rival systems of embossed printing naturally enhancing, as stated in a previous chapter, the cost of production. To use his own words, Mr. Gale "would like to see good works on grammar, geography, natural history, and so forth, added to the libraries of the blind." The volumes published by the London Society include the whole of the Bible, Liturgy, Pilgrim's Progress, Church Catechism, Collects, Selection of Hymns, and similar works. Having obtained special permission from Her Majesty, together with the requisite funds, Mr. Gale is now preparing for the reproduction, in embossed letters, on Lucas's system, of the Royal "Life of the late Prince Consort," under the superintendence of the society of which he is a member.

Scarcely less important than the work just mentioned is Mr. Gale's scheme of a "British and Foreign Association for the General Welfare of the Blind." The object of this society would be, according to Mr. Gale, "that of collecting from all the various institutions, and from every possible source at home and abroad, suggestions for the improvement of the condition of the blind generally; facts respecting the causes of blindness, etc., etc.; and as a means of gathering in their own aspirations and wishes as to such occupations or employment as might aid in raising them above the level of pity, and give them some independent *status* in the varied grades of society in which their lots may be cast." In connection with the proposed association, Mr. Gale recommends an International Congress of delegates from the Blind Institutions in Britain, France, Germany, America, and other parts of the world; also an annual conference of delegates from British institutions. Whether these suggestions will ever be carried into effect remains to be seen, but if the past may be used as a criterion of the future, our impression is that the ideas of to-day will become the facts of to-morrow.

During a visit made by Mr. Gale to Paris in 1865, he visited the great Institution for Blind Children in that city, and although his visit was made without previous notice, and on a day when the establishment

was closed to the public, the mere mention of his name procured him instant admittance, it having become familiar to the authorities by reason of its connection with the institution in Plymouth. He was readily conducted over every portion of the establishment, and afforded every means of procuring information. In the playground he found a number of sightless children amusing themselves with innocent pastimes, while in other parts of the building found blind young people practising various musical instruments, or following useful handicrafts, such as bookbinding, chairmaking, and mat-weaving. In the printing office attached to the institution were two or three blind compositors busily at work. Here Mr. Gale examined the various descriptions of type used in printing for the blind, receiving, as he did so, much information from the corrector of the press, himself a sufferer from deprivation of sight. Among the musical pupils he found a great deal to interest him. One of them, a youth about eighteen, was pointed out to him as having gained a prize at the Conservatoire du Musique, in a public competition, as the best player on the hautbois. Before he left, Mr. Gale was favoured by the performance of several pieces, instrumentalists and conductor all being blind. In that portion of the institution devoted to the female children Mr. Gale discovered a large number of blind girls, busily engaged in knitting stockings,

purses, and hair nets. Some were very skilful, and all asked that their work might be examined. The directress of this department proved to be a very intelligent and discriminating woman. On being asked whether she thought the blind should be taught by sightless or sighted teachers, she unhesitatingly replied that her opinion, based on the experience of many years, was decidedly in favour of blind instructors, one of her reasons being that such persons are generally more patient and docile than are those possessed of the power of vision. And here it should be remarked that, with one or two exceptions, all the professors and teachers in the institution are blind. The number of pupils ranges from one to two hundred. Most of these are maintained by scholarships provided by the French government and the municipality of Paris, the others each paying about £40 per annum for board, lodging, and washing.

It has often been a matter of remark that on the Continent the art of music is more cultivated among the blind than is the case with us. A movement, however, has recently been originated which, if successful, bids fair to open up additional sources of instruction and recreation for our poor afflicted brethren. It appears that some time ago a young blind lady found her way into one of the Tonic Sol-fa classes at Pimlico, and, possessing a quick ear, soon learned to join in the singing. She succeeded so

well that the teacher and her fellow members in the class wished her to sing in the performance of the "Flower Queen." But there was this difficulty, that she did not possess the necessary certificate of proficiency, without which no person is allowed to take part in concerts conducted on the Tonic Sol-fa system. The Rev. John Curwen, of Plaistow, however, found a means of overcoming the objection; and the coveted certificate, the first ever given to a blind person, was granted to the young lady. In conversation with the successful pupil, Mr. Curwen was surprised to find that instead of being a partizan of some one of the *ten* notations for the blind, she very much preferred, for musical purposes, to use exactly the same letters and symbols which are employed by "the sighted"—as she called all those gifted with vision. At first Mr. Curwen differed from her in opinion, and thought that it would be better to use some letters of simpler form—Moon's, or Lucas's, or Freer's. But she said that the blind had a pleasure in using the same things with the sighted. It gave them a wider companionship, and they could talk with the sighted about the things or signs they were using together. This corroborates the views entertained by Mr. Gale and others on the subject, and shows that we have yet much to do before we can say no more can be done. With the view of obviating the difficulties which might

be entertained by other blind students, a series of primary lessons of the Tonic Sol-fa system are to be printed in embossed type ; but at the outset a difficulty arose as to which system of alphabet—Moon's, Lucas's, Alston's, or Freer's—should be used. "As our first efforts for the blind," says Mr. Curwen,* "must necessarily be done by subscription, and we should probably require even to pay the blind poor to come and learn—perhaps 3d. a time, as a fee for their guides—we must confess that it seemed hard to us to have first of all to pay £20 to teach Mr. Lucas's blind people, and then another £20 to teach Mr. Moon's, and another to teach Mr. Freer's, and another to teach Mr. Alston's, and no end of pounds to teach the pupils of the various French and American systems of letters,—and after all this outlay get no further than the 'Wall sheets.' No, we are convinced that Miss Rogers is right. We must use the common letters, letters which the blind already employ in writing, and some of them in reading. There are only seven such letters to be learnt, and then a single £20 will carry the modulator and 'Wall sheets' into all the different schools of reading for the blind. All the other sets of £20, if we can get them, we can well employ in printing psalm tunes, anthems, chants, school songs, and cheerful glees, for those to

* *The Tonic Sol-fa Reporter*. December, 1867.

whom they would prove such an unspeakable solace and joy." This statement of Mr. Curwen's forcibly illustrates the difficulties besetting the path of those who would find place additional educational facilities within the reach of the blind, and proves the need for some such united mode of action as that suggested by Mr. Gale. With the establishment of the proposed British and Foreign Association, and the holding of the International Congress, it would be surprising if something could not be done towards correcting many of the now existing anomalies.

Well might our sightless hero look back with feelings of pride and satisfaction on the results of his unselfish endeavours to benefit his fellow-sufferers, whose path in life was rendered dark less by the affliction which had overtaken them, than by the gloomy shadows produced by poverty, neglect, and ignorance. He had begun to fathom the strange psychological phenomena with which the author of "*The Mystery of Pain*"* has sought to render us acquainted. Out of his suffering he had evoked pleasure, and from his experience he had learned that "nothing can make pain so good as that it should be borne for others." But for his apparently overwhelming affliction, he would never have enjoyed the indescribable pleasure, the exquisite delight, of

* *The Mystery of Pain*. London: Smith, Elder, and Co.

learning from his own great calamity to sympathise with the sufferings of his fellow-blind, and put forth his efforts for the purpose of ameliorating their condition. His success ought to ever remain an example to the timid and desponding, showing them that the smallest grain of good may bring forth richest fruit; and reminding each that although it may not be much that they can do, yet if at the close of their day on earth, the Master saith:—"They have done what they could," in heaven they shall have eternal glory. No wise man will, if he can possibly help it, pass through this world as a bird cleaveth the air, leaving no visible track behind him. He will rather seek to stud his course with good and noble deeds, such as cannot fail to encourage others who may be inclined to follow in his steps, and the thoughts of which shall preserve his memory ever-green in the loving hearts that have learned to regard him as their friend and benefactor.

CHAPTER VIII.

“Survey the magnet’s sympathetic love,
That woos the yielding needle; contemplate
Th’ attractive amber’s power, invisible
Even to the mental eye; or when the blow
Sent from the electric sphere assaults thy frame,
Show me the hand that dealt it! Baffled here
By His Omnipotence, Philosophy
Slowly her thoughts inadequately resolves,
And stands with all His circling wonders round her,
Like heavy Saturn in th’ ethereal space,
Begirt with an inexplicable ring.”

Smart.

“The fountains of divine philosophy
Fled not his thirsty lips.”

Halley.

A NEW OCCUPATION.

THE large amount of earnest, practical sympathy displayed by Mr. Gale in his various attempts to alleviate the social condition of the blind resident in his native county, although greatly occupying his time and energies, did not, however, preclude him from continuing the different scientific studies in which he took so much delight. On the contrary,

his zeal in the pursuit of knowledge increased daily, and he lost no opportunity of gaining fresh stores of information. While thus engaged, his attention became more and more devoted to the consideration of electricity, and its use as an agent for medical purposes. The subject had attracted his attention while he was yet a lad at Tavistock. He never wearied of listening to explanatory details of electrical phenomena, or of beholding experiments illustrative of the same. Such things possessed for him a strange fascination for which he could scarcely account, often leading him to ponder on the possible uses to which the mysterious electric fluid might ultimately be put. Not unfrequently he was induced to entertain the idea that in the hands of properly qualified practitioners the electrical forces might be utilized, and successfully employed in the treatment of various forms of disease. He was not at that time aware of the fact that, for many years previously, the question as to the adaptability of electricity to medical purposes had closely engaged the attention of numerous men eminent for their high scientific acquirements, both in Europe and in America. Yet so it was. Without going so far back as the period when Aristotle flourished, or that later date, somewhere about A.D. 50, when, according to Scribonius Largo, a freedman of Tiberius, by name Anthero, was cured of the gout by the shocks of the torpedo, it

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may be mentioned that from the time of Kratzenstein, who, in 1744, recorded a case of paralysis in a finger cured by a series of sparks evolved from a common electrical machine, to the present day, the art of medical-electricity has possessed numerous persevering and enthusiastic disciples, who have prosecuted their researches, unmoved either by the ridicule of the ignorant or the scorn of the prejudiced. In 1748 M. Jallabert, of Geneva, published a treatise, in which he furnished some interesting details respecting the beneficial results arising from a scientific use of the electric fluid in certain cases of paralysis. He was followed, in 1772, by the Abbé Sans, and, in 1778, by M. Morduit, who, in their turn, were succeeded by Cavallo, who, in his "Essay on the Theory and Practice of Medical Electricity," recommended the use of the electrical machine in various forms of disease. In 1802, M. Sigaud de la Fond published a treatise on the same subject, in which he most elaborately described the different methods which he deemed ought to be employed in the use of electricity for medical purposes.* In America, the subject was not practically taken up until 1816, when Dr. Thomas

* Among the authorities consulted in preparing this chapter may be mentioned *A Treatise on Medical Electricity*. By J. Althaus, M.D. London: Trubner and Co. Also *Medical Electricity*. By A. C. Garrett, M.D. Philadelphia: Lippincott and Co.

Brown, of Albany, New York, began practising the use of electricity administered in a mild form. Others followed with more or less success; but it is readily acknowledged, both by European and American practitioners, that their art received its chief impetus from the previous discoveries made by Galvani and his great rival Volta. The researches of Cruikshank, Dr. Henry Wollaston, Sir Humphrey Davy, Sir C. Wheatstone, and others, also proved valuable in developing the resources and capabilities of the new science; but the great step, after the discoveries of Galvani and Volta, was made in 1821, when the late Professor Faraday discovered the electro-magnetic rotative force, developed in the magnet by a wire conducting voltaic electricity, and in a conducting wire by a magnet. This proved a boon to the professional electrician, by placing in his hands an apparatus of great portability and of considerable value in the treatment of disease. "Still, up to this time, nothing had been done to establish medical-electricity as a science. A few practitioners here and there, thinly scattered over Europe, were, in secret, working to add facts to the great pile; but there were no clear laws laid down for the guidance of the student."* Of late years, however, the results of the

* *A Popular Treatise on Curative Electricity.* By H. Lobb, M.R.C.S.E., L.S.A., etc. London: Simpkin, Marshall, and Co.

long-continued and persevering researches of such men as Matteusci, Dubois, Raymond, Duchenne, Ziemssen, and others, 'have been displayed in the improved state of the science, although it is admitted that much yet remains to be learnt. Like most modern discoveries and innovations, the idea of applying electricity, as a curative agent, in the treatment of disease, was at first strongly resisted by many members of the medical profession, who entertained a great horror of aught which appeared to necessitate anything like a deviation, however slight, from the usual routine of medical practice; and during the earlier portion of the present century, the bitter hostility displayed by these, led to a considerable portion of the practice of the new science falling into the hands of ignorant and pretentious men, who speedily brought it into ill-repute, from the effects of which it took years to recover. At the present day, the value of medical-electricity, in the hands of skilful practitioners, for curative purposes in certain diseases, is tacitly admitted by the generality of the profession, although, our knowledge of medical-electricity still being in its infancy, the various laws which govern the science are as yet but imperfectly known.

When Mr. Gale's sight began to fail him, he was strongly advised to have recourse to medical-electricity for relief. This was in 1849. He applied to a

celebrated operator, but the treatment proved unsuccessful, Mr. Gale's being a case of amaurosis, and considered as hopeless by every medical man who had been consulted in the matter. The attempt, however, revived his old interest in the subject of electricity, and kindled within his breast a strong desire to investigate personally its various phenomena. With this view he eagerly perused all the scientific works which came within his reach, his connection with the Tavistock Mechanics' Institute here proving extremely useful. In this way he contrived to collect a large amount of solid and practical information, which afterwards he was enabled to turn to good account. Thus time passed on, until, in 1850, an eminent medical galvanist from London came on a visit to Tavistock, and was immediately sought by Mr. Gale, who had been recommended by several of the local physicians to procure his advice. Although his eyesight was too far gone to be restored by any known method of treatment, yet Mr. Gale's general health was considerably improved by the many successful applications of medical-electricity.

During his visits to the London practitioner, Mr. Gale became acquainted with many of the operator's patients. Most of these were suffering from various severe forms of disease, and he was enabled to mark the influence of medical-electricity in promoting their recovery. These effects were so decidedly favourable

in character, that he became animated with the inclination, notwithstanding the knowledge that he was doomed to become totally blind, to devote a large portion of his future life to the practice of this interesting branch of medical science. Expressing his wishes to the operator under whose care he had been placed, he found himself encouraged to persevere, the gentleman in question readily lending him suitable books, answering every enquiry, and otherwise furnishing such information as laid the real foundations of Mr. Gale's present professional knowledge. About this time a circumstance occurred which tended to confirm the young would-be electrician in the views adopted by him. Sitting one day in a chamber, where he was being subjected to a course of medical-electrical treatment, he was struck with the apparent condition of a fellow patient who sat next to him, and who appeared unaffected by the galvanic current applied to him. An irresistible feeling of curiosity induced Mr. Gale to rise from the operating chair, and, in the absence of the professional electrician, place the conductor on another part of the patient's body. This, however, not producing the expected results, set Mr. Gale seriously meditating as to the probable causes thereof; and, after the patient had left, he mentioned the circumstance to a friend, who naturally asked of him what conclusions he deduced therefrom. Mr. Gale

replied that he considered the patient to be in such a deplorable state, that it was improbable he could live much longer—that it was almost certain he would die suddenly. In answer to another question, he stated he did not think it possible that the poor fellow could live more than a fortnight at the uttermost. Strangely enough, within eight or nine days from the date of that conversation, the patient alluded to had passed away from the land of the living. He was found dead in bed, holding a stocking in his lifeless hand, showing that death had overtaken him suddenly, thereby confirming the involuntary prediction uttered by Mr. Gale, who has frequently since that period striven, but in vain, to recall to his mind the various reasons on which his conclusions were based. The sad circumstance tended, as might readily be supposed, to strengthen his convictions in favour of the new and, to him, fascinating science.

Mr. Gale's faith in the curative powers of medical-electricity was increased also by another fact which came under his notice, and which is worth relating here. Oliver Goole was a poor labourer at Tavistock, who had for many years been a sufferer from a severe spinal complaint, which had been pronounced incurable by nearly every physician whom he had consulted. When Goole first applied to the operator, whose patient Mr. Gale had become, his frame was bent nearly double, and his strength seemed to have

departed from him. He was at once placed under a proper course of treatment, and nothing interested Mr. Gale so much as to mark the gradual improvement which took place in the health and strength of the poor fellow. At last he enjoyed the great satisfaction of beholding the once infirm and decrepit patient standing erect in all the dignity of manhood, and without experiencing the slightest pain ! This result took the local medical men completely by surprise. On James Gale relating it to one of these, he was met with the observation :—" All right, young enthusiast, but it won't last." But it *did* last, for years rolled on, and Oliver Goole remained a living witness of what medical-electricity, properly applied, could effect.

When the deprivation of sight overtook Mr. Gale, he managed to continue his researches into the workings of the science of which he had become so fond ; and when he removed to Plymouth, it was not long before he devoted all the time he could possibly spare from business and from the labours generously undertaken by him on behalf of his sightless brethren to the study and practical employment of the knowledge acquired by him. His success in this direction was so considerable, that at last he resolved upon leaving the business in which he was partner, and embracing the profession of a medical-electrician. The decision proved a wise one, the increased num-

ber of patients testifying to the popular confidence reposed in Mr. Gale's professional knowledge and skill. One circumstance had no little influence in determining Mr. Gale's change of profession. This was the belief that by so doing, he would be enabled to prosecute more closely his scientific studies, and at the same time possess sufficient leisure for efforts in the cause of the blind. Nor was he mistaken. But he was not destined to remain in Plymouth, for various circumstances connected with the invention detailed in the following chapter, necessitated Mr. Gale's removal to the metropolis. Here, however, he continued to follow his profession, and before long had acquired a considerable practice.

In 1866, he was elected Fellow of the Chemical Society at Burlington House; the same year also beheld his admission as Fellow of the Royal Geological Society. Becoming acquainted about the same time with a German gentleman, of great repute as a Hebrew, Greek, and Teutonic scholar, and who had been employed as a teacher of languages by several of the most distinguished noblemen in the country, Mr. Gale allowed himself to be persuaded to study diligently for the degree of Doctor of Philosophy, a title not granted in English universities, although duly recognised by them. The recommendation that Mr. Gale should endeavour to procure the degree arose from his friend's confident belief in the

wide extent of his general knowledge, his scientific acquirements, and the argumentative powers displayed by him in philosophy and general literature. Mr. Gale at once set to work, and his two amanuenses were kept fully employed for several months, relieving each other in turns. Not unfrequently the approach of morning found Mr. Gale busily engaged in this way, and his assistants certainly had no idle time of it. The friend before-mentioned undertook to examine him privately, and in due time was appointed by the ancient University of Rostock to report on the abilities, etc., of the blind student. Rostock is the largest town in the Grand Duchy of Mecklenburg-Schwerin, a great portion being built in the fashion of the old German free cities. The tomb of Grotius is contained in the church. The university, which to this day retains its ancient respectability and dignity, was founded in 1419. It has a valuable library of eighty thousand volumes, many of which are of great rarity, including the extensive collection of Oriental and Spanish literature formed by the late Professor Tyschen. There are also a rich collection of coins, natural history museum, anatomical theatre, and other important adjuncts. The number of professors ranges from twenty to twenty-five, but the students are comparatively few, seldom exceeding a hundred and fifty. At the end of February, 1867, the preliminary arrangements for

Mr. Gale's examination were completed, and a lengthy essay, on several most abstruse questions in natural philosophy, was written, in presence of the examiner, by the amanuenses from the dictation of the sightless candidate. But although acknowledged by the university authorities to contain a considerable amount of erudition and originality of thought, the essay was not accepted; one or two of the Rostock professors considering that an elaborate explanation of several original ideas should be given, and that a second essay, devoted to an entirely different subject, chosen by themselves, should be prepared by Mr. Gale. This was an unexpected rebuff, but its only effect was to arouse yet further Mr. Gale's energy and determination. Again he set to work, with even greater zeal than before, and so intense was his ardour and perseverance that, within two months from the date of his failure, he announced himself as ready for a second and even more stringent examination. This time he victoriously passed the ordeal, and before many days had elapsed his diploma was safely forwarded to him, and he found himself entitled to the degrees of Doctor of Philosophy and Master of Arts.

We append a copy of the diploma. It is in Latin, and the style is somewhat grandiloquous and antiquated, the ancient German seats of learning being, as a rule, even more persistent in retaining their

olden formularies than are those in this country, where it is considered almost a sin to suggest any change, however slight, in the ancient customs of Oxford or Cambridge.

QUOD FELIX FAUSTUM FORTUNATUMQUE SIT
Summis Auspiciis
 SERENISSIMI PRINCIPIS ET DOMINI NOSTRI CLEMENTISSIMI
 DOMINI
 FREIDERICI FRANCISCI
Magni Ducis Megapolitani
Principis Venedorum Suerini et Raceburgi
Comitis Suerinensis
Terrae Rostochiensis et Stargardiensis Domini
Universitatis Hujus Literariae Patroni Munificentissimi
Atque
Cancellarii Magnificentissimi
Rectore Academiae Magnifico
 CAROLA FRID. BARTSCH
Philosophiae Doctore
Germanicarum et Recentiorum Literarum Professore Publico
Ordinario Seminarii Philologici Teutonici Nec Non
Numothecae Directore
 VIRUM PRAENOBILISSIMUM ET DOCTISSIMUM
 JACOBUM GALE
Anglum
Propter Multiplicem Variamque Eruditionem Duabus
Commentationibus Probatum
 PHILOSOPHIAE DOCTOREM ARTIUMQUE LIBERALIUM
 MAGISTRUM.
Creatum Esse
 PUBLICO HOC DIPLOMATE

Comfirmat

*Ad Hunc Actum Olementissime Constitutus Promotor et
Procancellarius*

CAROL. FRID. HERMANNUS ROESLER

Juris Utriusque Oeconomiae Publicae Ac Philosophiae Doctor

• Doctrinarum Politicarum Professor Publ. Ordin.

Ordinis Philosophorum H. T. Decanus.

P. P. ROSTOCHII SUB SIGILLO ORDINIS PHILOSOPHORUM

DIE VII M. MAJI MDCCCLXVII.

L.S.

The foregoing may be freely translated as follows :
—“ May This be Happy, Auspicious, and Fortunate.
By the Supreme Favour of the Most Serene Prince
and Most Gracious Lord Frederick Francis, Grand
Duke of Mecklenburgh, Prince of Schwerin Meck-
lenburgh, the Most Munificent Patron of the Uni-
versity of Letters, and Most Munificent Chancellor—
By the Magnificent Rector of the Academy, Charles
Frederick Bartsch, Doctor of Philosophy, Public
Professor in Ordinary of German and Modern Litera-
ture, Director of the Seminary of German Philology
and Classical Learning; the Most Noble and Most
Learned Man, James Gale, an Englishman, on account
of his manifold and various Erudition, proved by his
two Theses, is created Doctor of Philosophy and
Master of the Liberal Arts, by this Public Diploma,
confirmed by the Promoter and Pro-Chancellor most
graciously appointed in that behalf, Charles Frederick

Hermann Roesler, Doctor of Laws, Public Economy, and Philosophy, Public Professor in Ordinary of Political Science, Dean of the Order of Philosophers. Published at Rostock, under the Seal of the Order of Philosophers, May 7, 1867.

CHAPTER IX.

“The bursting shell, the gateway wrenched asunder,
The rattling musketry, the clashing blade;
And ever and anon, in tones of thunder,
The diapason of the cannonade.

“Is it, O man, that such discordant noises,
With such accursed instruments as these,
Thou drownest Nature’s sweet and kindly voices,
And jarrest the celestial harmonies?”

Longfellow.

THE GUNPOWDER CONQUEROR.

ONE bright morning, during the autumn of 1864, the myriad inhabitants of the English metropolis were suddenly startled and not a little alarmed by the occurrence of a fearful shock, as if a violent earthquake had taken place in no distant part of the country. Houses trembled to their foundations, windows were shattered to pieces, people unresistingly hurled from their beds, heavy articles of furniture displaced, stoutly-locked doors forcibly burst open, clocks and other automaton pieces of mechanism suddenly stayed in the midst of their working. At

first no one could even guess at the cause of the astounding phenomenon. Not a few imagined the metropolis to have been visited by one of those terrible outbursts of volcanic forces which so frequently spread ruin and desolation throughout vast districts of tropical country, and of which we have had such an awful illustration in the recent catastrophe at Tortola, in the West Indies. By and bye, however, it became extensively known that the tremendous shock which had occasioned such consternation in London was not the result of any convulsion of nature, but of an explosion which had occurred almost simultaneously in two powder-magazines, situated in Plumstead Marshes, on the southern bank of the Thames, between Woolwich and Erith, and about fifteen miles from Charing Cross. One of the magazines belonged to Messrs. Hall and Son, the other being the property of the Lowood Powder Company. The quantity of gunpowder in the magazine belonging to Messrs. Hall is stated by them to have been seventy-five barrels, each containing one hundred pounds of the explosive material. There were also about two hundred more barrels in the barges moored to the jetty at the river side. The Lowood Company's magazine contained about nine thousand pounds of gunpowder. Other estimates gave a larger quantity. It should be distinctly understood that these places were used for the

storage only of gunpowder, not for its manufacture, every known precaution being adopted to prevent the possibility of explosion. The manufacturing works of Messrs. Hall and Son are situated at Faversham, in Kent, where they occupy about two hundred acres of ground, part of the factory having been erected so far back as the time of Queen Elizabeth. How the disaster was occasioned has never yet been ascertained with any degree of certainty ; but the evidence furnished during the inquest on the bodies of those who perished from the effects of the calamity, led to the inference that there were three distinct explosions : the first being on board one of the gunpowder barges in the river, the concussion thus produced tearing asunder the walls and roof of the larger magazine, the interior of which, ignited by some of the burning fragments of the barge, exploded, firing, in its turn, the smaller magazine, the whole occurring in less time than we have taken to describe it. As it was, the results were terrible. Every house and building in the immediate neighbourhood was completely destroyed, more than one hundred yards of the thick, massive earthwork forming the river wall was thrown down, and several lives were sacrificed, to say nothing of the heavy loss of property. Of the magazines themselves, not a single stone remained upon another. The work of destruction was complete. The very foundations were torn up, the

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site of the building belonging to the Messrs. Hall being marked by huge fissures and chasms in the earth, immense lumps of which had been scooped out and hurled about the adjacent fields, as if an army of Titans had been engaged in furiously pelting each other with gigantic clods. In Woolwich, some four or five miles distant, a considerable amount of damage was effected. Windows were shattered, frames and sashes dashed in, and several persons severely injured. In many houses ceilings and portions of the walls were thrown down, and the people rushed from their homes in dismay. Those who happened to be in bed—for it was between the hours of seven and eight in the morning that the explosion occurred—found themselves helplessly rocked to and fro as if they were in ships at sea. At Chatham and Rochester, twenty-five miles off, the force of the shock was distinctly felt. In Chatham dockyard, the windows of the chief buildings were violently shaken and the locked doors burst open. The explosion was also heard and felt at Uxbridge, more than thirty miles from the scene of the disaster; also at Windsor, Teddington, and other distant places—even so far as Cambridge and Ely. In Erith itself the ground heaved and trembled for several moments with the force of the explosion.

A complete panic took possession of the public mind when these facts became known. It was

remembered that the quantity of gunpowder which had produced these appalling results was utterly insignificant in comparison with that known to be stored in the various magazines in and about London, belonging either to the government or to private individuals. The Purfleet stores alone were known to contain thousands of tons of gunpowder, more than sufficient to lay all London in ruins, while the Marshwood magazines at Southampton actually contained 25,000 more barrels than were stored at Purfleet. About 2,000 tons of powder were likewise stored at Plymouth. Somewhat smaller quantities were also stored at Chatham, Portsmouth, and elsewhere. Each day the alarm became more and more intensified, until a loud cry arose for legislation of a stringent character on the subject. Still, it was instinctively felt that even with every possible precaution, both on the part of individuals and of the public, the risk of explosion would always remain. The use of lights might be forbidden, the wearing of a particular dress and felt or leather shoes enforced, and the admission of unauthorised persons prohibited, and yet the danger not be prevented. In vain might the magazines be surrounded by moats and embankments, vigilantly guarded night and day: a single spark, and every precaution would be futile. In an instant the work of death and destruction would have become consummated, beyond all possible hope of prevention.

The recent Clerkenwell explosion affords a powerful illustration of the terribly destructive effects of gunpowder. One hundred and fifty pounds of the explosive material were sufficient to produce the scene of havoc and confusion which produced such alarm both in the metropolis and in the provinces. At Erith, the actual amount of powder exploded is believed to have been 1,040 barrels, or 104,000lbs., each barrel containing 100lbs. What then would be the result of an explosion at Southampton, where, instead of 1,040 barrels, there are from 70,000 to 80,000? Or at Purfleet, where, instead of forty or fifty tons, there are between two and three thousand? It is almost too dreadful—too appalling—to contemplate. Why, let an explosion take place at Purfleet, and London would almost become annihilated! Not a building in the whole metropolis could survive the tremendous shock, which would rival in its consequences some of the most stupendous convulsions of nature, of which history has furnished any record. At the present moment, even as for years past, the Londoners have been slumbering on the crumbling brink of a hidden volcano, the sulphureous flames of which may at any moment unexpectedly burst forth in unrestrained fury and overwhelm them; as instantaneously and mercilessly, even, as were the bewildered and horror-stricken inhabitants of Herculaneum and Pompeii

engulfed in the burning ashes and molten lava belched forth from the fiery mouth of Vesuvius.

Nor have warnings been wanting to show the need of some effective precautions against the danger of explosion. Ever since gunpowder became an article of use in Europe, we have been familiar with accounts of the perils attending its storage. Of late years, we have had some memorable instances, among which the explosions at Inkermann, Salonica, and Mayence, stand most prominent. The first of these created much sensation at the time. About half-past three during the afternoon of November the 15th, 1855, the opposing forces in the Crimea were suddenly aroused from their momentary lethargy by a terrific explosion which took place within the French lines. At first, the prevailing idea in the allied camps was that a mine had been sprung by the Russians, and that an attack was imminent; but in a short time it was discovered that the explosion was the result of accident. It appeared that the French supplies of ammunition were stored in a place known as the Park, an inclosure about one hundred and fifty feet in length by fifty feet deep, and surrounded by a stone wall, which separated it on one side from the British siege train; and in this depôt, besides large quantities of combustibles for war purposes, were stored 100,000lbs. of gunpowder. Some French artillerymen, at the time of the

catastrophe, were busily engaged in shifting this powder from case to case. The usual orthodox precautions were taken for the purpose of preventing accidents; but as one of the men was emptying the explosive material from a case, he perceived a fragment of a shell gliding among the powder through the funnel. Striving to shake it out, the piece of metal fell on a few loose grains of powder lying on the stone floor, and these, becoming ignited, produced the disaster which was attended with such deplorable results. This, at least, was the opinion formed by those who investigated the matter at the time. The explosion which took place was tremendous. The graphic pen of Dr. W. H. Russell, the famous "special correspondent" of the *Times*, has furnished a vivid account of the catastrophe. "The phenomena were so startling," said he, "that they took away one's breath. Neither pen nor pencil could describe them. The rush of fire, smoke, and iron, in one great pillar, attained a height which I dare not estimate, and then seemed to shoot like a tree which overshadowed one half of the camp on the right, and rained down missiles upon it. The smoke retained the shape of a fir tree for nearly a minute; and then the sides began to swell out, and then the overhanging canopy began to expand and twist about in prodigious wreaths of smoke, which flew out to the right and to the left, and let drop, as it were,

..... from solution in its embrace, a shower of shells, carcasses, and iron projectiles. The noise was horrible, and as the shells began to explode, the din was like the opening crash of one of the great cannonades or bombardments of the siege." Describing the attempts successfully made to protect the English magazines, two hundred yards distant, Dr. Russell proceeds :— "The rockets now began to fly about and to increase the alarm ; but the wind, which had been rather high, abated towards evening, and the fire died out. While it lasted, the effects were grand and terrible. Hundreds of rockets rushed burning and bursting through the air at one time ; sheets of flame, flashing from the explosive gunpowder carcasses, glared through black clouds of smoke, and shells burst hissing high in the air. Burning beams of wood, and showers of sparks, with boxes of small-arm ammunition that exploded with a rattling report like musketry, and flew about in little balls of fire. The escapes were astounding. Clothes were torn off men's backs ; the chairs or beds on which they sat, the tables at which they were eating, the earth where they stood, were broken and torn by shot and shell, rockets, iron shrapnel, grape, canister, and musket balls, which literally rained down upon them." An army surgeon, who was present, writes :—"A sound like the combined thunders of a century went up to heaven, and the earth, for a mile round, quaked and rocked like

an angry tide. No air! No breath! Struggle out and gasp for life! No sky to be seen. A thick darkness over all—lurid, sulphureous, and pestilential. Another and another roar, and a bellow and a crash re-echoed by every hill—reverberating through trench and ravine, stirring the very dead in their graves. And now a shower of blackened and blood-stained fragments, mutilated human limbs, hands, arms, legs, feet, pieces of skull, shattered bones, even solitary ribs with fibres of muscle yet quivering, are blown about like chaff before the blast. Men who have faced death in every form are flying hither and thither in frenzied horror! Shells are shrieking in the air, or bursting overhead! Rockets are streaming fire, minie and grape flying on every side, and there is no hiding-place.” The loss of life was fearful. Thirty-five blackened corpses of Frenchmen were picked up during the few minutes after the panic had subsided. Of many a score brave fellows not a finger’s breadth remained. Every officer of the French Siege Train was killed. The French General Hospital, crowded with patients, was levelled in an instant; and seventeen were killed, and scarcely one escaped unwounded. The English loss was principally in the Light Division. The Royal Artillery suffered more than any other regiment. Men were killed and wounded a mile away—in the 14th, 49th, and 77th Regiments; and shot and shell fell even in

the Victoria Redoubt. The total loss, French and English, was estimated at between four hundred and five hundred killed and wounded.

When the tidings of the explosion reached England, a thrill of horror ran through the heart of the nation ; and as each succeeding mail brought fuller details of the catastrophe, of the lamentable loss of life by which it was accompanied, and of the fearful scenes agony of which it had been the cause, there were few of who did not in their souls wish that the skill and inventiveness of man, so fertile in devising new and more deadly instruments of war, could be exerted for the purpose of rendering harmless a substance, the very existence of which was a continual menace and a danger to the places in which it was stored. Scientific men turned their attention to the subject, but without tangible result. Enthusiastic inventors strove to construct patent safety-barrels, and similar appliances ; while the multitude—with Mussulman-like logic—argued that there was no escaping destiny, that gunpowder would always possess its dangerous and fatal character, that it was impossible to render it completely harmless, without, at the same time, depriving it of those qualities which caused it to be so powerful an instrument in the hands of the warrior and the engineer.

Little did the world dream how, at that very moment, an unknown and comparatively obscure

young man, the victim of a sad infirmity which precluded his ever beholding the features of his fellow-men, had commenced the solution of the problem which for centuries had baffled the ingenuity of all who had sought to penetrate its hidden mystery. Still less did the good folks of Tavistock imagine that in James Gale, their blind fellow-townsmen, with whose cheerful features and jovial disposition they were so familiar, they possessed a quiet and thoughtful scientific enquirer, to whom would one day be given the power for which so many had long and vainly striven, and whose name as an inventor would add another to the long list of those worthies, in the possession of which Devonshire is justly proud. Nor did James Gale himself at first fully realise the importance of his discovery, with the principle of which he had been familiar, almost from very childhood. When a boy, he, like most lads, was extremely fond of fireworks, but not having the means of purchasing them, save in infinitesimal quantities, he found himself compelled to make them in the best manner he could. He soon became expert in the production of squibs and crackers, and found himself enabled to indulge, at a comparatively trifling expense, in his taste for pyrotechnics. One day, making some crackers, with the aid of a little coarse-grained gunpowder, and wishing to lessen the too-rapid combustion of the latter, he mixed it with some

non-combustible substance—fine, impalpable dust obtained from his father's works. But instead of merely reducing the explosive power of the gunpowder, Gale found he had completely destroyed it. The consequence was that his fireworks were rendered utterly useless. Though filled with gunpowder, they obstinately refused to ignite. Here was a pretty fix for a young lad in a hopeless state of impecuniosity! Gale's pockets were empty and his gunpowder was spoilt, seemingly beyond all hope of remedy. What was he to do? Some lads would have sat down and cried with sheer vexation; others would have got into a downright passion; while some would have treated the matter as a proof of their incapacity, and have there and then forsworn their amateur practice of the pyrotechnical art.

Young Gale, however, did neither one nor the other. With characteristic promptitude he came to the conclusion that as he had successfully mixed the gunpowder with the sand, he might be able also to *unmix* it; in other words, to separate properly the two ingredients. Had he been a little older, he would have hesitated before he attempted what practical men had solemnly declared to be an impossibility; but, being simply an inexperienced youth possessing some belief in the axiom that "where there's a will there's a way," he resolutely persevered with his project. Still, it was all very well to resolve

upon accomplishing his intention, but *how* was he to do so? To pick out the separate grains of powder would be a most slow and laborious process, to say nothing of the danger attending it. At length the mind of the youth became suddenly inspired by a happy thought. Watt's first idea of the steam-engine was suggested by the light vapour issuing from the mouth of a kettle; the elements of Dr. Gale's famous invention were revealed to him by the thought of an old pair of bellows and a common fire-shovel, which, together with a heavy weight, constituted the somewhat primitive machinery, by the aid of which he anticipated gaining his desired object. Very simple was the process employed by him. Through a ring attached to the weight he passed the nose of the bellows. Placing the powder and dust upon the shovel, and resting the latter on the ground, he commenced operations. Putting the nose of the bellows carefully on the shovel, the weight keeping it in its place, he stooped down and commenced carefully blowing. As he expected, the dust, being lighter than the grains of powder, was soon partially separated; but both his hands being employed in working the bellows, Gale's labours did not progress very rapidly. However, he was not to be daunted. He was on the right track now, and he meant to keep at it. Procuring a short piece of string, he fastened one end to the lower handle of the bellows, making

a loop at the other end, in which placing his foot and raising the same up and down as if working a lathe, he was enabled to accomplish the blowing process satisfactorily, leaving one of his hands at liberty to assist in the labour of sifting. The result was that young Gale found himself in possession of his gunpowder, scarcely diminished in bulk, and certainly undeteriorated in quality.

Little importance was attached by Gale to this incident at the time, and the remembrance of it speedily passed away. When the Russian war aroused the military energies of the country, Mr. Gale found himself sharing the general excitement then prevalent. True, his eyesight had departed from him, but his studious and inventive disposition remained. For the details of what followed we are indebted to the pages of a magazine devoted to military affairs.* "As will be remembered, at that time, there was much discussion going on respecting the best mode of erecting land batteries, whether of stone or earth. We had learnt several severe lessons from the Russians on the subject, and amongst others the value of earthworks. Mr. Gale then began a series of experiments, with a view of testing the extent to which earthworks could resist shot; and amongst others he constructed a barrier of impalpable material, and

* *Colburn's United Service Magazine*. September, 1865.

placed inside it a heap of gunpowder as the representative of the magazine. While endeavouring to send some small shot and ball through this barrier, the gunpowder and impalpable material got mixed, and he found that some of it was very difficult to explode. The idea immediately recurred to him :— ‘ Can this be made useful in saving life, or rather in preventing loss of life ? ’ The recollection of what took place in his boyish days flashed across his mind, and he set to work in endeavouring to separate the explosive from the non-explosive parts ; but instead of using the bellows with one hand, and employing the other hand in stirring up the mixture to allow the wind to penetrate it, he used a sieve, which was much more convenient, and by which the dangerous particles were more easily separated from the others. The question with him then was, what material will be best to mix with the gunpowder so as not to injure or destroy it ? And here he found that several articles which were for many reasons suitable, were for others quite unfit. While progressing slowly in this good work, the news reached him of the explosion of the French siege train at Inkermann, where nearly four hundred men were either killed or wounded. This gave fresh impulse to his endeavours, and made him determine to overcome his difficulty. He tried, we believe, not less than fifty different kinds of mixtures : some were too expensive, others

were entirely useless for the purpose; others, like alum, absorbed the damp, or, like lime, spoilt the gunpowder; or, like calcined china clay, adhered to it. He then used powdered glass, and after allowing some gunpowder to remain several years in a quantity of that material, he found that the gunpowder had not deteriorated in the least, that the glass flour was easily separated therefrom, and that the gunpowder exploded immediately fire was placed near it."

During these interesting experiments, Mr. Gale was greatly stimulated by the occurrence of several immense explosions of gunpowder, one or two of which were mentioned in a preceding page, namely, those at Salonica and at Mayence. Salonica, the Thessalonica of Scripture, is a city of European Turkey, situate in Roumania, about two hundred and seventy miles from Constantinople. About nine o'clock in the evening of Friday, the 11th of July, 1856, a great fire broke out in a Turkish Khan or inn, situated in the Frankish, or European quarter of the town. As usual in eastern cities, where many of the houses are built of extremely combustible materials, and closely crowded together, the conflagration spread rapidly, occasioning much consternation in all directions among the ill-fated inhabitants. The difficulty with which the semi-Asiatic people resident in the Roumanian dominions of the Porte are roused into useful action on such occasions, was overcome

by the determined demeanour exhibited by the governor of the city, and the fire was, after a praiseworthy display of energy on the part of the crowds assembled, subdued. The danger over, as they supposed, the multitude were preparing to retire to their homes, when suddenly there came a low, sullen roar, and the next moment the streets were filled with terror-stricken groups of alarmed and bleeding men, women, and children, frantically struggling to escape being crushed to death by the tottering walls, or devoured by the cruel flames which had again burst forth in all their savage and unrestrained fury. Bewildered by the suddenness of the calamity, the poor wretches could not at first fully comprehend the exact nature of the disaster which had befallen them; but it subsequently transpired that a certain John Schlizzi had, unknown to any one save a few confederates, secreted in his house about two hundred barrels of contraband gunpowder; and that this, by some means exploding, led to the catastrophe which for many a day afterwards cast a gloom over the fortunes of the ill-fated city. This explosion cost Salonica more than a hundred lives, and a loss of property estimated at a hundred million piastres, or one million English pounds sterling.

The other explosion alluded to was that which took place at Mayence on the 18th of November, 1857. During the afternoon of that day, while the

soldiers were performing their customary drill in the courtyard of the citadel, the powder-magazine suddenly blew up, with a shock which was felt at Wiesbaden, on the opposite side of the Rhine. Two soldiers and fourteen civilians were killed almost instantaneously; one hundred and eight soldiers, besides three hundred civilians, being more or less dangerously wounded. In the city, upwards of sixty houses were destroyed, and numbers of others seriously damaged. The ancient church of St. Stephen was nearly laid in ruins, and the other churches and public buildings of the city were considerably damaged. The loss of property on this occasion was estimated at more than a million florins (£100,000).

There was likewise the famous case of the *Lotty Sleigh*, a vessel laden with gunpowder, and which, exploding in the river Mersey, nearly frightened the inhabitants of Liverpool and Birkenhead out of their senses. Fortunately there was no loss of life on this occasion, but the narrow escape which both towns experienced forms a theme of conversation in them to this day. In fact, for years past, we have been accustomed to hear from time to time of fearful gunpowder explosions, and the frightful loss of life and property occasioned thereby. At one time it is a suburb of St. Petersburg which forms the scene of disaster; next, the glistening waters of the Southern Atlantic reflect that terrible catastrophe which ren-

dered the gallant *Bombay* a floating mass of shattered and blackened timber ; while at another moment an American city contributes its share to the long and sickening record of mishap and ruin. The Mobile explosion was indeed a horrible calamity. It would appear that on the 24th of May, 1865, while the ammunition was being removed by the victorious Federals from the Confederate magazines in Mobile, the ordnance stores, situated in the centre of the business part of the city, suddenly blew up with a terrific report. It was estimated that three hundred persons were killed and many hundreds wounded. Several thousand persons are said to have been buried in the ruins of the city. Two steamers lying at the pier were destroyed, as also were eight thousand bales of cotton. It was but the other day that we had tidings of an extremely destructive explosion at Faversham, where are situated the gunpowder manufacturing works of Messrs. Hall and Son. A few minutes before eleven o'clock on the morning of December the 27th, 1867, the inhabitants of Faversham were startled by a deafening noise, followed in an instant by a second and third report even louder, and accompanied by a concussion which shook the place like an earthquake. Almost instinctively people knew what had happened. The works had exploded. In an hour the horrible truth became known that eleven men had been killed, that as many wives

were made widows, and nearly thirty children left fatherless. "The only element of consolation in relating a disaster of this magnitude," says the writer to whom we are indebted for these details, "is that the destruction might have been fifty-fold greater. The powder which exploded bears a very small proportion to that which escaped ignition. It is impossible to estimate what the consequences would have been had a spark communicated with the magazine, and that its contents remain intact is little short of a miracle." As at Erith, there were three distinct explosions, the first occurring at about five minutes before eleven, the second half a minute afterwards, and the third was only separated from the second by an interval of about ten seconds. The first took place in the corning house, where the process of granulating the crude mass of moist material, which had been prepared in the adjoining building, was being performed. "Corning" is one of the most perilous processes in gunpowder making, and the workmen employed in it are always the most experienced and careful that the manager can select. Only a very small quantity of the material is operated on at a time, and the object is to accomplish the work with the smallest possible amount of friction. The destruction of the first building communicated the fire to the mixing house, and from this it spread to the third structure. "Words," we are told, "will

only convey a faint idea of the scene presented on that fatal Saturday afternoon. There was nothing picturesque about it. It was simply ghastly and revolting—a sight to shudder at, not to see. Large elms had been uprooted and thrown across the lane. Others were almost completely stripped of their branches, and showed nothing but broken splintered trunks. The young trees around the corner house had been cut down as if with an axe, and those more remote were blasted and destroyed. The ground was torn into furrows or scooped into holes. The dyke was blocked up with fallen masonry. Not a vestige of roof remained on three of the buildings. The walls facing the river were totally swept away, and for hundreds of yards over the adjacent fields bricks were strewn more thickly than in the prison yard at Clerkenwell. An immense mass of iron, weighing eighteen hundred weight, had been lifted off the press house and flung two hundred yards, into the Ham Farm, where it made a deep pit. Numbers of dead rabbits and pheasants were found in the plantation. But where were the human remains? At first not a trace was to be found; then somebody saw something black amongst the leafless branches of a high tree, which turned out to be the leg of a man, and by degrees fragments of bone and flesh and shreds of clothes were picked up in the *débris* that covered the marshes. As soon as possible

the search was proceeded with, and here and there amongst the ruins pieces of flesh were discovered, which were carefully gathered and deposited in an adjoining carpenter's shed. Not a limb was perfect, and the unfortunate mourners were totally unable to recognise the mutilated remains of their husbands and fathers. The tremendous force of the explosion was evinced by the immense rents which had been made in walls more than six feet thick. The upper portions of these had been broken off, and projected distances of between fifty and one hundred yards. Single bricks were found on a rising ground nearly three quarters of a mile away. The damage would have been infinitely greater but for the larger embankments which surrounded three sides of each of the houses in the mills. All the windows in Ham farmhouse were broken, some of the sashes and frames were clean torn out, and the roof cracked and partly stripped. In Faversham a great deal of glass was smashed, and furniture thrown down. The people declare that in some places the houses, which were for the most part low and very strongly built, perceptibly rocked. It is stated that in Canterbury the reports were heard with great distinctness, and the shock sensibly perceived. As far away as Herne Bay and Margate, people heard a crash like a distant peal of thunder. Two or three persons who were working in the fields and marshes, near the mills,

describe the immediate effect of the explosion as something marvellous. They saw the roofs of the houses blown into the air to the height of several hundred feet, and falling in huge fragments to the ground. The place was covered with a dense cloud of smoke and dust, which hung for a considerable time in the foggy air. The water in the river was greatly agitated, and some of the pools in the marshes were literally emptied."

Up till 1865, Mr. Gale was quietly and secretly employed in prosecuting his experiments, the news of each successive explosion naturally tending to increase his ardour in the attempt to bring his discovery to a practical issue; and having successfully tested the strength of a quantity of gunpowder which he had separated from some finely-crushed glass flour, he, during the excitement caused by the Erith explosion, determined to take the first opportunity of placing his invention before the public, who first became acquainted with it by means of the *Western Morning News*, the readers of which were informed that a means had been discovered of rendering gunpowder non-explosive and explosive at will; the process for effecting the same being simple, effectual, and cheap; the quality and bulk of the gunpowder remaining uninjured. "We have seen," said the notice, "gunpowder subjected to this process and stirred with a red-hot poker without

an explosion. If a shell burst in a store filled with the prepared powder, it would not fire it." These assertions awakened no little curiosity among those who became acquainted with them; but, excepting the few who had been initiated in a knowledge of the process, there were not many who believed in the really efficacious character of the new invention. By some, Mr. Gale was set down as a self-deluded enthusiast, one of that numerous class who are continually fancying that they have penetrated the secret of perpetual motion, or invented a new motive power. Not so, thought the more practical minds to whom Mr. Gale's process was duly submitted. To them there appeared sufficient merit in the invention to justify a series of public experiments, by way of testing its efficiency. Accordingly, arrangements were made for a trial of the process at the Government House, Mount Wise, Plymouth; and on the 27th of June, 1865, a large party of naval and military officers, including Major-General Viscount Templeton, C.B., Major-General in Command of the Western District; Admiral Sir Charles Howe Fremantle, C.B.; Admiral Symonds; Colonel Benn; Major Colley; Colonel Mann; Mr. W. Eastlake, solicitor to the Admiralty; and Captain Barnet, assembled on the lawn in front of the Government House, where they awaited the commencement of the experiments. The first of these was performed

with a small quantity of gunpowder, which was rendered non-explosive, and then restored to its original condition in less than two minutes. Others followed, chiefly with government gunpowder, and with equal satisfactory results. The slow match, placed among the protected powder, lighted the grains with which it came in contact, but no explosion took place. During the time that the match was burning, Mr. Gale held in his hand the vessel containing the gunpowder! In one of the concluding experiments, a red-hot poker was introduced into the protected gunpowder; but a few grains only of powder were lighted. For an hour and a half the trial lasted, the invention being subjected to every test that scientific and military knowledge, experience, and skill could possibly devise; and at the close, Viscount Templeton, approaching our blind inventor, whose features were animated by a smile of triumph, congratulated him upon "having fulfilled in every respect the statements which he had made in reference to his invention."

The conqueror had become conquered. The mighty power which perpetually endangered our lives and property by its presence had become shorn of its terrors; the tyrant found itself transformed into a slave; and the nation—nay, the whole world—found itself indebted to James Gale, the Plymouth electrician, for the means whereby scores of busy cities

and densely-populated towns could be effectually preserved from the deadly peril ever hovering near them, threatening widely-spread destruction to life and property, and filling men's minds with consternation and horror.

CHAPTER X.

“ Would'st thou win? Pass thou then up life's steep hill—
Be patient—persevering—swerving not
To right or left, but keeping proudly on,
Heedless of foe, of falsehood's flatt'ring arts,
Smiling at doubts of cold and envious friends,
Until the golden wreath is in thy hand—
Then those who frown'd on thee will brightly smile,
And those who kindly smiled will smile the more.”

AN INVENTOR'S TRIUMPH.

THE experiments so successfully performed on the lawn in front of the Government House at Plymouth, were speedily followed by others, equally satisfactory, at Wimbledon Common, where the annual encampment of the British Volunteers had just been formed. Here Mr. Gale gave further illustrations of the efficiency and value of his newly-discovered process, and expressed his willingness to take his seat upon a barrel of gunpowder placed on the common, and allow a red-hot poker to be plunged into it, provided he were first allowed to add his

preparation to the contents of the barrel. The offer, however, was not accepted, the conclusive nature of the experiments made by him rendering any such proof of confidence wholly unnecessary. A few days afterwards Mr. Gale was found repeating his now famous experiments before the Prince and Princess of Wales, at Mount Edgecumbe, they then being on a visit to Plymouth. The Duke of St. Albans, Countess Dalkeith, Earl Mount Edgecumbe, General Knollys, Major Grey, and many other distinguished personages were also present. The Prince, who was naturally enough somewhat apprehensive of the results when he first saw the slow match burning down into the powder, immediately gained confidence on seeing Mr. Gale calmly holding in his hand the vessel containing the protected gunpowder. He subsequently made minute inquiries as to the nature of the invention, at the same time expressing pleasure that the subject had been taken up by the War Office. The experiments were repeated in London, at the Langham Hotel, in presence of Viscount Bury and other gentlemen; at the French Embassy; and before the Select Committee of Woolwich Arsenal, the various members of which, after carefully investigating Mr. Gale's method, unanimously expressed an opinion in its favour. Shortly afterwards the working of the new process was exhibited before the Duke of Cambridge, at the Horse Guards,

when, after carefully noting the various experiments and their results, his Royal Highness warmly congratulated Mr. Gale on the unmistakable success of his invention, which he felt convinced would prove to be of national importance. Public demonstrations of the process, now fully secured by patents, also took place at the Artillery Ground, London, and at Bristol, Liverpool, Manchester, and other places, with equally encouraging results. Other experiments were likewise made in presence of the Secretary of State for War; also at Ravensbury, the seat of Mr. Bidder, the eminent engineer, where a large number of scientific persons had assembled; and in Westminster, on a waste piece of ground opposite the Westminster Palace Hotel.* On this latter occasion there was a perfect crowd of scientific and professional notabilities present. The representatives of the press also mustered in strong force. On no occasion whatever did the experiments fail to produce the desired results; on the contrary, every fresh trial proved more conclusively the complete efficiency of the invention.

The newspapers were not dilatory in making Mr. Gale's discovery more widely known to the public, and before long the Blind Inventor and his process

* An illustration of this latter scene will be found in the *Illustrated London News* of August 12, 1865.

for rendering gunpowder explosive and non-explosive at will, became the topic of the day. The press were loud in their eulogiums of the new means for depriving gunpowder of its terrors, and concurred with the Prince of Wales in designating its inventor the "Gunpowder Tamer." The *Times* deemed it remarkable that so valuable a secret should have fallen to the lot of one to discover in our own day who is suffering under the sad privation of loss of sight. The *Daily Telegraph* stated that the various experiments had proved conclusively that Mr. Gale had hit upon the secret of chaining up the awful forces of the deadly material, until the time came to let them loose. The *Morning Herald*, speculating on the probable results of the discovery, considered that it was probable that by rendering gunpowder thus practically safe, a means would be opened for its utilization in ways which have not hitherto been attempted. The *Pall Mall Gazette* thought Mr. Gale had really discovered the secret of making gunpowder non-explosive without injuring it, and believed that the discovery would probably save thousands of lives, as it would be possible to store powder at the manufactories and on board ship in a non-explosive state, and sift it only when served out for actual use. The *Morning Star* stated that "From being a chimerical idea, calculated to astonish country gentlemen and provoke a smile of pity on

the faces of respectable authorities, the non-explosive gunpowder, as it is familiarly called, had worked its way upward to be recognised as a definite fact." The *Daily News*, *Standard*, *Illustrated London News*, *Army and Navy Gazette*, *Mechanics' Magazine*, *Mining Journal*, and many other papers, both metropolitan and provincial, also expressed their approval of the invention. Descriptions of the new process speedily found their way into most of the leading continental journals; also into many of those published in Australia, India, America, and even China.

But an unexpected honour was awaiting our inventor. On the return of the Prince and Princess of Wales from Mount Edgecumbe, they naturally spoke to the Queen of the strange experiments which Mr. Gale had performed before them at Plymouth; and some few weeks afterwards, on the arrival of the court at Windsor from Balmoral, Mr. Gale was requested to attend Her Majesty for the purpose of explaining and illustrating his process. Accordingly, on the morning of Thursday, November 10th, 1865, Mr. Gale had the honour of displaying his experiments before the Queen, who appeared to take a deep interest in them. A bowl of the protected gunpowder having been produced, a portion of the mixture was separated, for the purpose of showing the facility with which the gunpowder could be

restored to its original condition. The bowl with the rest of the powder was then held by Mr. Gale in his hands, and a slow match allowed to burn down into it, but no effect was produced beyond lighting a few grains. Vesuvians were afterwards thrown in, but they failed to fire the mixture. A test originally suggested by Viscount Bury was then resorted to. This consisted in placing a small quantity of pure gunpowder in the midst of the protected powder, and firing the same; but although the unprotected gunpowder exploded as a matter of course, the protected powder remained unaffected. This portion of the proceedings appeared to possess a special interest for the Queen, who expressed her concern that Mr. Gale was holding the bowl too near to himself. It was, however, soon apparent that there was no danger. The Princess Beatrice and Prince Leopold were not present during these experiments; but they having now arrived, the Queen asked that the illustrations of the process might be repeated before them. This was done, and as the experiments were being performed a second time, they were explained by Her Majesty to the royal children, in a manner which showed not only that the Queen perfectly understood the principle of the invention, but that it was her wish that her children should also fully comprehend it. Entering into conversation with Mr. Gale, Her Majesty became acquainted with the circumstances

which led to his discovery of the means whereby gunpowder could be rendered harmless or otherwise at pleasure ; and expressed her interest in his brief but instructive narrative. The closing experiment consisted in placing a bag containing five pounds of gunpowder, together with the requisite quantity of protective mixture, upon a fire. This was apparently a most sensational affair. In reality, however, not the slightest danger existed. The bag and its contents were gradually consumed without the least approach to an explosion. The Queen, who had throughout displayed a remarkable amount of scientific knowledge, on leaving the orangery, said to Mr. Gale—"I thank you. I have been much pleased and interested in your experiments. It is a wonderful invention, and ought to be made very, very useful." She then retired, accompanied by the Princess Helena, Princess Beatrice, Prince Leopold, and Prince Louis of Hesse. In his earlier days, Mr. Gale, like most provincials, entertained a strong desire to obtain a glimpse of the beloved monarch, whose name appears to act like a charm on her people's hearts ; but when the fatal infirmity of blindness closed his eyes for ever in this world, the wish became apparently impossible of realization, and was reluctantly dismissed from his thoughts. He never dreamed that in the after-years of his life he should possess an opportunity of conversing with his Sovereign, much less that he should

hear her remarkably clear and musical voice thanking him for explaining a process, the discovery of which has placed him in the foremost ranks of England's inventors. Yet so it was, and as Mr. Gale stood in the orangery of Windsor Castle, he felt that it was indeed one of the proudest moments of his life, one which amply repaid him for all the toil, labour, and anxiety entailed by his researches, to say nothing of the scepticism, jealousy, and even malevolence with which his success had been regarded by an envious few.

Some few weeks previous to his visit to Windsor Castle, Mr. Gale attended the annual meeting of the Polytechnic Society of Cornwall, for the purpose of personally explaining his invention. This was at the end of August, 1865. At the close of the experiments a scientific gentleman objected to powdered glass as a protective material, alleging that it absorbed moisture and would cause the powder to cake in a mass. This objection, which was purely theoretical, has since been proved to be utterly without foundation; while so far as the mere incombustibility of the protected powder was concerned, the success of the experiments was complete. The *Western Daily Mercury*, of September 1st, 1865, reporting the proceedings, states that—"A small box was next filled with the protected gunpowder, and a red-hot poker having been procured, Mr. Saunders stirred up the contents;

but the only effect produced was a few sparks, which were emitted by the portions with which the poker came in contact. This produced a marvellous effect on the minds of the audience, and their astonishment was still further increased when the box was pitched into the burning fire ; and there it remained for some time without giving any signs of an explosion, and when it did ignite it burnt away very steadily and slowly." From the same authority we learn that the judges appointed by the Cornwall Polytechnic Society to report concerning the merits of Mr. Gale's invention, approved of it, and awarded the blind inventor a first-class medal. In their report they stated that if any means could be adopted to lessen the bulk of the protecting material,* the invention would become one of national importance ; one which would unquestionably effect a great saving of life and property. The mixing and sifting processes were effected so easily, that the judges were of opinion that they would not materially interfere with the general adoption of the process.

Towards the close of October, Mr. Gale found himself in Paris, whither he had proceeded for the purpose of explaining his invention to the government authorities. The newspapers had already

* This objection has since been proved to be more imaginary than real, as will be seen by reference to the succeeding chapter.

familiarized the French with the character of the new process, but as yet no experiments had actually been made in Paris. Here, while waiting the reply of the Emperor, Mr. Gale discovered much to interest and amuse him ; but he had little leisure for studying the habits and customs of the Parisians, his time being largely occupied in displaying his experiments before Vicomte Talon, Colonel Loriell, and others, whose friendship had been gained by him during his stay in the French capital. He had brought with him to Paris the machine for separating the gun-powder from the protecting mixture, and he frequently caused a smile to arise on the features of his auditors as he related to them the suspicious manner in which the French custom-house officials at Boulogne regarded the strange and, to them, mysterious-looking apparatus. Every attempt at explanation on Mr. Gale's part tended to increase their suspicions of something wrong—of some new political plot being on the verge of consummation ; and but for the timely production of a letter from the French ambassador in London, Mr. Gale would have been detained at Boulogne until the authorities in Paris had been communicated with. As it was, the officials, with much reluctance, allowed him to proceed on his journey. On November the 22nd, Mr. Gale performed, with his customary success, the various experiments illustrative of his process before the French

Ordnance Committee, the members of which appeared much surprised with the results. At first, somewhat dubious as to the efficacy of the invention, they kept at a respectful distance from the protected mixture; but gradually their confidence returned, and they crowded round the sightless experimentalist and his companion, Mr. Lukis, who acted throughout as interpreter for Mr. Gale. The whole of the committee expressed themselves completely satisfied with the decisive character of the various experiments, General Le Bœuf, the President of the Committee, shaking hands heartily with Mr. Gale, and congratulating him on his unmistakable success. While staying in Paris, he became acquainted with a gentleman (M. Van Langerove), formerly private secretary to the Duc de Morny, whose assistance proved very serviceable to our inventor in smoothing the way for introductions to those in authority. Mr. Gale was compelled to leave Paris without having an interview with the French Emperor, although General Favre promised his cordial assistance to bring about one; but in February, 1866, he found a second opportunity of visiting France. This time the custom-house officials at Boulogne treated him more considerately, and made no attempt to interfere with his movements. On arriving in Paris he received a note from General Favre, instructing him how to proceed. In two or three days' time, an official note was received from the

Duc de Bassano, the Emperor's chamberlain, stating that the imperial decision would be made known to him in a short time. Mr. Gale had, however, in the meantime learnt that the Emperor, having made himself thoroughly acquainted with the nature of the protecting process and the satisfactory results achieved by its means, did not perceive the necessity for further experiments, especially as he would not be enabled to afford pecuniary assistance, all purchases connected with the military department being made through the Ordnance and other committees. It was, however, at last settled that Mr. Gale should have an audience of the Emperor on the first opportunity. As some days would necessarily elapse before this could take place, Mr. Gale started for Brussels, having previously forwarded his letters of introduction to the King and the Minister of War. On arriving in the Belgian capital, he had a pleasant interview with General Douny, who expressed his satisfaction with the success of Mr. Gale's invention, with the character of which he had become acquainted through the instrumentality of the Belgian newspapers. Soon afterwards the now well-known experiments were performed in presence of the Minister of War, who appeared much impressed with the efficient character of the invention. During his stay in Belgium, Mr. Gale visited the field of Waterloo, where, engaging the services of Martin Pirson

as guide, he was conducted to the more celebrated localities of the famous battle plain. The little church, within whose precincts lie interred the remains of many a gallant fellow who fell in that terrible conflict; the homely cottage in which the Iron Duke partook of supper on the eve of the eventful day on which were to be decided the fortunes of Europe; Hougoumont, which formed the key of the British position, and where the battle most fiercely raged; the "Lion Mount"; and a score of other historical places, were visited by Mr. Gale and those accompanying him. Very strange were his feelings as he stood on the fertile plain, the rich luxuriance of which is attributable to the decomposing bodies of the slain resting in peace below the soil. On that memorable occasion when

"The midnight brought the signal-sound of strife;
The morn the marshalling in arms—the day
Battle's magnificently stern array,"

terrible indeed was the carnage. The god of destruction was at his hellish work, bidding men employ to the utmost all that art, science, and skill could teach them in maiming and killing each other. And now here was a simple Englishman,—a man deprived of the blessings of sight—standing upon

"This place of skulls,
The grave of France, the deadly Waterloo,"

musings, not upon the means of immolating myriads of his fellow-creatures, but on the manner in which they might be preserved from the dangers of untimely death or accident. As he trod the path leading to the Lion Mount, and listened to the description furnished by his guides of the scene around him, James Gale felt, in the words of Byron, that his tread was "on an empire's dust," that the rich harvest reaped by the Belgian farmer was all the world had gained by Waterloo. As he left the little church in the village, he was accosted by an aged woman, Marie Josephe Bodinghen, a character well known to English tourists, who, describing how she had assisted in tending the wounded during the great battle, coaxed her hearer into the offering of a small gift. Very many were the so-called relics, in the shape of swords, belts, pistols, and so forth, which were pressed upon Mr. Gale for purchase. Fortunately, he declined investing any cash in the same. We say fortunately, for the manufacture of such "relics" forms a lucrative occupation on the Continent. Mr. Gale, however, brought away with him a skull, with an ugly dent in it, which had been discovered while digging up the roots of a tree. Returning to Paris, he amused himself by visiting the various churches and other public edifices, but more particularly the different charitable institutions, especially that established for the use of the blind, his experiences of which we have already

related.* Although on the Duc de Bassano's list for an audience of the Emperor, business matters at home were too pressing to admit of Mr. Gale's further stay in Paris, and he had to return without having an opportunity of conversing with that strange and remarkable man who has exercised such a powerful influence on the character and fortunes of the French people.

In June, 1866, the English Government, who had from the first been testing, by means of experiments on a small scale, the efficiency of Mr. Gale's invention, gave orders for an experiment of a somewhat remarkable nature. Determined to render the final trials as severe and conclusive as possible, the War Office had devised an experimental test of an almost unprecedented character. They had tried the efficiency of Mr. Gale's process in every possible manner, and always with the same unvarying success. "Barrels of gunpowder," we are told, "thus protected, have been placed on bare fires, have had red-hot poker thrust into them, and the loose mixture has been thrown by shovelfuls into the fire, but all in vain. It would not explode, and, in the great majority of instances, when tried in tolerably large quantities, it would not even burn." At length a test, as ingenious as it was conclusive, was devised by the Select

* Pages 144 to 160.

Ordnance Committee. This was made on the afternoon of Wednesday, June 20th, 1866, in a Martello Tower, No. 37, situated on the Sussex coast, about seven miles south of Hastings, and midway between that town and Winchelsea. The site of the tower selected for the experiments had been much encroached upon by the sea, so as to render its early demolition extremely probable; hence its suitability for the proposed trial. The building was peculiarly adapted in other respects. It consisted of a circular space, the internal diameter of which was about thirty feet, divided by a wooden floor, and covered with an arched roof, which did not admit of any escape upwards. If, therefore, any serious explosion occurred, it must, as a simple matter of course, have completely torn the building asunder. All the arrangements were under the superintendence of General Lefroy, President of the Ordnance Select Committee, who, in company with many officers belonging to that Committee, together with General St. George, and Professor Abel, the Government chymist, were present during the day. Mr. Gale had no share whatever in the proceedings, except that he furnished the protective compound, which was mixed with the gunpowder, in accordance with instructions furnished by him, by a number of workmen from Woolwich Arsenal. But although for the purpose of rendering the experiments more satisfac-

tory, he was not allowed to interfere in any way, Mr. Gale was present, by official invitation, as a spectator. Mr. Saunders was also present during the whole time. For the purposes of the trial, five tons of the strongest Government powder were mixed with twenty tons of the protective mixture, and packed in three hundred and thirty-eight barrels. Although five tons of gunpowder is a large quantity of explosive material, it is comparatively small compared with the ordinary contents of a magazine, which are seldom below forty or fifty tons ; but, of course, it was quite sufficient to have produced a most serious explosion, unless efficiently protected by Mr. Gale's process. One hundred of the barrels were filled each with thirty-two pounds of gunpowder and one hundred and forty-four pounds of the mixture, and stored in a small magazine situate in the basement of the tower. Two hundred and thirty-eight barrels, each containing thirty-two pounds of gunpowder and one hundred and twenty-eight pounds of protective mixture, were stored on the floor (a wooden one) of the tower, in a circle two feet deep and five high, a passage of about three and a half feet in width being left between the barrels and the central pillar on the inside, and the barrels and the wall outside, so as to assimilate to the passages customary in magazines. It was proposed to fire the magazine thus formed under conditions approximating as closely as possible to what

might occur in reality, either by accident or design. A galvanic tube, with fuze attached, was inserted in the midst of some pure gunpowder, in each of two barrels centrally situated on the basement storey, a barrel on the upper floor being treated in like manner, after which a quickmatch was conducted from each barrel so treated to the adjoining ones, so that all might be simultaneously ignited. The galvanic wires were then conducted to the next Martello tower, No. 38, about half a mile distant, where the electric battery, brought specially from Shoeburyness, had been fixed under the direction of a competent officer. All being ready, the experimentalists quietly retired from the immediate neighbourhood of the anticipated explosion, a strong body of mounted police assisting in keeping back the crowd of spectators attracted by the novelty of the proceedings. The fuze attached to the barrel on the upper floor was first fired. There was a moment of dread suspense, every one but Mr. Gale and Mr. Saunders anticipating the worst; but as minute after minute slipped away without any effect being visible, the confidence of the crowd began to return. After an interval of twenty-five minutes, one of the barrels in the basement of the tower was fired, and six minutes later the second was fired also. The third attempt to explode the powder was followed by a slight puff of smoke from the chimney on the roof of the tower, but explosion there

was none! The progress of combustion was in fact so slow, that General Lefroy, accompanied by Mr. Saunders, Mr. Abel, and Captain Noel, proceeded to the tower, where it was found that the heads of one or two barrels on the upper floor had been blown off; but in consequence of the dense and stifling smoke, the exact state of affairs could not be ascertained. It was subsequently discovered that the head of the barrel to which the fuze had been attached, had been blown off by the force of the small quantity of unprotected gunpowder used in attempting to produce an explosion. General Lefroy and his companions were, however, enabled to descend into the basement storey, where it was found that the third fuze had not taken any effect at all. While here one of the company actually thrust a lighted cigar fuze into one of the barrels! The experiment proved completely harmless. So far, the Government trial was complete, and had resulted in Mr. Gale's favour, it having been found impossible to explode the protected gunpowder. Mr. Gale, however, desired a yet more powerful test, and, to the evident consternation of all present, actually proposed to *fire the building with all its contents!* The most strenuous opponents of Mr. Gale's invention could not have devised a trial more severe than this. The Ordnance Committee, excited by the proposal, looked on with deepening interest as the labourers began piling straw

and firewood against the barrels of powder on the upper floor; but neither Mr. Gale nor his colleague, Mr. Saunders, doubted, even for a single moment, the ultimate result. Indeed, so confident was Mr. Gale, that he repeatedly offered to stand on the roof of the tower during the whole of the experiments. When the preparations were completed, the combustibles were fired and left to burn. Dense volumes of smoke began to issue from the door and windows of the tower, but no flame was visible, although the noise of fire crackling was distinctly heard at intervals. Occasionally, too, a barrel would be heard to fall to pieces as the hoops were burnt off; but the noise was very slight, and only marked by a low rumbling sound, accompanied by a great puff of smoke. The peculiar colour and odour of the smoke showed that the gunpowder was being consumed very slowly, although the interior of the tower had by this time become converted into a huge furnace. Perceiving that there existed not the slightest danger, General Lefroy permitted several gentlemen to approach the burning edifice and gaze on the scene within. Shortly afterwards two uninjured barrels were got out of the tower from those nearest the door, and placed on an immense bonfire formed of dry brushwood, which had been got ready for the purpose. Fiercer and fiercer waxed the flames, as, fanned by a strong breeze from seaward, they played

around the doomed casks, the woodwork of which was soon penetrated by the burning element. But no explosion followed. On the contrary, the mass of protected powder rather deadened down the flames at first, and it was only at the edges that the mixture fizzed and spluttered like a bad portfire. Curiously enough, when the barrels were removed from the tower, the head of one was taken off for the purpose of ascertaining the condition of the powder. One of the spectators taking up a handful of the compound, a sudden gust of wind separated the gunpowder from the protecting mixture. The gunpowder, thus unexpectedly restored to its original condition, was ignited, on which it instantly exploded with a loud report. During this time the fire continued to rage in the tower, although no flame—nothing but dense volumes of smoke—was visible. Wearied of waiting, General Lefroy and the committee retired from the scene, first leaving instructions with the district Master-Gunner to report as soon as the tower was fit to be entered. The fire was reported on the 25th as still burning, but on the 28th, or more than a week afterwards, the tower was sufficiently cool to be entered without danger. On the 30th of June, ten days afterwards, an inspection of the interior of the tower showed that the whole of the barrels on the upper floor had been entirely consumed, as well as the floor itself, a small portion of its wooden support only remaining.

The barrels in the basement were almost uninjured, although a few near the door were charred on the outside. One of the barrels was taken out, opened, and the protecting mixture separated from the powder, which freely exploded on being lighted, without the least sign of deterioration in any way. Several of the barrels which had escaped ignition were subsequently stored in another tower for the purpose of ascertaining how far the efficacy of the protecting mixture was affected by time. The correspondent of the *Times* newspaper, who was present during the experiments, describing the first day's proceedings, says :—"Occasionally, a sudden increase in the volumes of smoke indicated that a barrel had burst,* and exposed an unusual quantity of powder to the flames ; but so confident had the gentlemen become who had witnessed the experiments, that they continually looked into the building, and actually went inside the door to see how the powder was burning. This they were enabled to do from the strong in-draught of fresh air which entered at the bottom of the doorway, while dense columns of smoke ascended from the top. So totally mastered was the explosive character of the gunpowder, that after the fire had been burning nearly two hours, a

* The bursting thus alluded to was occasioned by the burning of the hoops, which caused the barrels to fall to pieces.

window which had been closed on one side of the building was found quite perfect, and the glass was broken from the outside in order to admit more air to increase the fire. Apparently, however, even this considerable accession of air produced no effect. The barrels kept smouldering from one to another, but no more." The success of this remarkable and important experiment decisively proved the efficacy and utility of Mr. Gale's invention.

A few weeks afterwards, our blind inventor had wended his way to Nottingham, where the annual congress of the British Association for the Advancement of Science was being held. Here he visited the Blind Institution in Chaucer Street, also the various places of interest in the town and neighbourhood, besides taking a prominent part in a large temperance meeting, under the presidency of the Rev. A. Gilbert, in Shakespeare Street Chapel. But it was not to visit Belvoir, or to pace the groves of Clifton, or to take part in temperance meetings, that Mr. Gale had come to Nottingham. He had something more to do. His object was to comply with a special invitation to exhibit the character of his invention before the members of the association. For this purpose ample facilities were provided him. At two of their grand soirées, held in the Working Men's Industrial Exhibition Building, a spacious and convenient structure, the new process was illustrated in

presence of a large number of guests, including many of the leading scientific celebrities of the day. Very strange and suggestive was the appearance of the scene. On the roomy orchestra—whence a few brief moments previously, a military band had been discoursing sweet melodies, and surrounded by a bevy of blooming maidens and grave-featured *savans*, behind which rose a bright and dazzling background of shrubs, flowers, works of art, pictures, scientific apparatus, and numerous objects of a curious and interesting nature—stood our blind inventor, a smile of triumph lurking on his sightless features, calmly and convincingly demonstrating the unerring certainty of his process for taming the dreaded tyrant—even as, in the hands of the engineer, steam has been converted from the master into the slave. The experiments were perfect. To show the fallacy of the allegation made some months before to the effect that the efficacy of the protective mixture was injured by damp, Mr. Gale placed some protected gunpowder in water. After being immersed more than half-an-hour, it was taken out, the protected mixture sifted from it, after which it instantly exploded upon the application of a light. The illustrations were subsequently repeated at mid-day in the grounds of Nottingham Castle, when, among other experiments, Mr. Gale took a cask, about the size of an oyster barrel, containing ten pounds of pure gunpowder which he had

previously protected, and placing the same under his arm, stirred it with a red-hot poker, without producing any further effect than smoke, and when the poker was withdrawn the fire went out. The successful character of Mr. Gale's invention was now fully established. It had passed triumphantly through every test, however severe, and henceforth nothing remained but to turn its advantages to practical use.

CHAPTER XI.

"I hear e'en now the infinite fierce chorus,
The cries of agony, the endless groan,
Which through the ages that have gone before us,
In long reverberations reach our own.

On helm and harness rings the Saxon hammer,
Through Cimbric forest roars the Norseman's song,
And loud, amid the universal clamour,
O'er the desert sounds the Tartar gong.

I hear the Florentine, who from his palace
Wheels out his battle-bell with dreadful din,
And Aztec priests upon their teocallis
Beat the wild war drums made of serpents' skin;

The tumult of each sacked and burning village;
The shout that every prayer for mercy drowns;
The soldiers' revels in the midst of pillage;
The wail of famine in beleagured towns."

Longfellow.

SOMETHING ABOUT GUNPOWDER.

WHO was the inventor of gunpowder? For years popular tradition has awarded the honour to Roger Bacon, while in Germany it would be deemed

rank heresy were one to question the claims of Bartholdus Schwartz as inventor of one of the most fatal and destructive compounds ever employed for the purposes of warfare. It is, however, now pretty largely admitted that neither to England nor Germany belongs the credit of inventing gunpowder. According to Dutens, gunpowder must have had an origin so ancient as to be almost fabulous. Certainly, if quotations from Greek and Latin authors, referring to the use of artificial thunder and lightning, are to be trusted, gunpowder can boast an extremely venerable antiquity, taking us far back into the remote past, even to that point where the mythic becomes so closely incorporated with the real, that the separation of one from the other appears a simple impossibility. Dutens is of opinion "that the attempts of Salimoneus, King of Elis, to imitate thunder and lightning, suggest to us that the prince used a composition of the nature of gunpowder. Eastathius (a commentator on Homer), in particular, speaks of him on this occasion as being so very expert in mechanism, that he formed machines which imitated the noise of thunder; and the writers of fable (whose surprise in this respect may be compared to that of the Mexicans when they first beheld the firearms of the Spaniards) gave out that Jupiter, incensed at the audacity of this prince, slew him with lightning as he was employing himself in launching his thunder." On which

Colonel Anderson, to whose work*—in common with those of others—we are largely indebted for the materials used in the preparation of the present chapter, remarks, “it is much more probable to suppose that this unfortunate prince (an inventor of gunpowder) gave rise to these fables by having accidentally fallen a victim to his own experiments.” Others carry the epoch of the invention almost as far back as the time of Moses, it being asserted that gunpowder is alluded to in a code of Gentoo laws, dating some fifteen centuries before the time of Christ. This may appear rather startling to the unlearned, whose notions of ancient warlike weapons are confined to swords, spears, battle-axes, slings, maces, and the like; but the concurrent testimony of all reliable historians tends to show that firearms were more frequently used in ancient warfare than is commonly supposed. Halhed, in the preface to that master-piece of patience, laborious research, learning, and care—the compilation known as the “Code of Gentoo Laws,”† translates as follows the passage alluded to:—“The magistrate shall not make war with any deceitful machine, nor with poisoned weapons, nor with *cannon* and *guns*, nor any kind of

* *Sketch of the Mode of Manufacturing Gunpowder.* By Colonel William Anderson, C.B.; with Notes and Additions by Lieutenant-Colonel Pariby. London: Weale. 1862.

† London. 1776.

firearms." Commenting on this, the learned translator remarks :—"The reader, no doubt, will wonder to find a prohibition of firearms in records of such remote antiquity; and he will probably renew the suspicion which has long been deemed absurd, that Alexander the Great did absolutely meet with some weapons of this kind in India, as a passage in Quintius Curtius seems to assert. Gunpowder has been known in China as well as in Hindostan far beyond all periods of investigation. The word 'firearms' is literally translated by the Sanscrit *agnee-aster* (*aguyastra*), a weapon of fire. In their earliest form they are described to have been a kind of dart tipped with fire, and discharged by some sort of explosive compound from a bamboo. Among several extraordinary properties of the weapon, one was that after it had taken its flight it separated into several streams of flame, each of which took effect, and which, when once kindled, could not be extinguished; but this kind of *agnee-aster* is now lost."

According to Sir George Staunton, the knowledge of gunpowder in China and India must have been coeval with the most distant historic events. "Among the Chinese it has at all times been applied to useful purposes, as blasting rocks, etc., and in the making of fireworks; although it has not been directed through strong metallic tubes, as the Europeans did soon after they had discovered it." By the earlier Arab

historians saltpetre is called "Chinese snow" and "Chinese salt," and the most ancient records of the celestial empire itself show that when they were written—several hundred years before the time of the Christian era—fireworks were well-known; but although the use of gunpowder as a combustible or explosive compound appears to have been so long familiar to the Chinese, we can procure no reliable information as to when it was first used by them as a propellant. There is an ancient account of a bamboo being used from which a certain impetuous dart was hurled at a distance of one hundred feet. It is also recorded that more than six hundred years before the time of Christ, a cannon was employed, bearing the inscription, "I hurl death to the rebel." Captain Parish, who accompanied Lord Macartney's mission to China, describes certain embrasures visible in the Grand Wall of that country. These embrasures were evidently intended for the use of cannon, and formed part of the original wall. This would show that in China at least firearms were in use three hundred years previous to the Christian era. It is stated that there are no longer gunpowder manufactories in China, a circumstance which, if true, may tend to explain the assertion of Barron to the effect that the Chinese soldiers manufacture their own gunpowder, each soldier preparing the quantity requisite for his own use; a system which, in our

opinion, speaks highly of the skill of the soldier, or very little for the quality of the gunpowder so produced. The use of the destructive material seems to have gradually spread from the east to the west. "Dion Cassius, a native of Bithynia, who flourished about A.D. 230, reports of Caligula, that this Emperor had machines which imitated thunder and lightning and threw stones. Joannes Antiochenus corroborates the same statement."* Allusions to a composition resembling gunpowder now became pretty frequent. "Philostratus, who lived about the year 244," says Colonel Anderson, "wrote the life and travels of Appollonius Thyanceus, a philosopher who is considered to have made extended travels in the East and in Hindostan." On the authority of this traveller, it is recorded, "that when the Indians of towns are attacked by their enemies, they do not rush into battle, but put them to flight by thunder and lightning." On the same authority it is said that Hercules and Bacchus, attempting to assail the Indians in a fort where they were intrenched, were so roughly received by reiterated strokes of thunder and lightning launched upon them from on high by the besieged, that they were compelled to retire." "Agatheus, a historian of the time of Justinian,"—continues Colonel Anderson,— "reports also that one

* Colonel Anderson.

Anthemius, having fallen out with his neighbour, Zeno the Rhetorician, set fire to his house with thunder and lightning." In the works of Julius Africanus, who flourished A.D. 220, Dutens mentions that there is a receipt for an ingenious composition to be thrown upon an enemy, which nearly resembles gunpowder. We now lose sight of the Latin authorities; more precise information being probably lost in the dark ages of the Gothic period. An Arabian physician, called Mesue, is the first author brought forward as evidence. He lived about the ninth century, and mentions an author called Marcus Græcus. A work in manuscript exists under the name in the Royal Library at Paris, entitled "*Liber Ignium*." This author describes several ways of encountering an enemy by launching fire on him, and among others gives the following:—"Mix together one pound of live sulphur, two of charcoal of willow, and six of saltpetre, reducing them to a very fine powder in a marble mortar." He adds that a certain quantity of this is to be put into a long, narrow, and well-compacted cover, and so discharged into the air. "This," remarks Colonel Anderson, "is a clear description of a rocket; and the entire extract speaks of the composition and the effects of gunpowder." It is now generally assumed that the mysterious "Greek Fire" of the ancients, or, at least, one of the principal compounds bearing that name,

was nothing more nor less than gunpowder. Mr. Timbs, in his "Stories of Inventions and Discoveries,"* alluding to Mesue's work, says that "the celebrated oriental scholar, M. Reinaud, has discovered an Arabic MS. of the thirteenth century, which proves that compositions identical with gunpowder in all but the granulations were, and had been for a long time previously, in the possession of the Arabs; and that there is every probability that they obtained them from the Chinese in the ninth century. Many of these were called 'Greek Fire;' and comparing the account of Joinville, of the wars on the Nile in the time of St. Louis, with the Arabic recipes, there can be little doubt that we are now in possession of what was then termed 'Greek Fire.'" "Mr. Grove, F.R.S.," continues Mr. Timbs, "who has investigated the subject experimentally as well as historically, concludes that the main element of Greek Fire, as contradistinguished from other inflammable substances, was nitre, or a salt containing much oxygen; that Greek Fire and gunpowder were substantially the same thing; and that the development of the invention had been very slow and gradual, and had taken place long antecedent to the date of Schwartz."

The question as to the introduction of gunpowder into Western Europe is involved in much obscurity.

* London. 1863

In a paper read at the commencement of the present century, before the French Institute, M. Langles argued that the use of gunpowder was conveyed to us by the Crusaders, who, having learnt its use from their Arabic opponents, employed it at the siege of Mecca in 690. Maimbourg, in his "History of the Crusades," relates that when, in A.D. 1099, the Saracens were defending Jerusalem from the attacks of Godfrey, they "threw abundance of pots of fire and shot fire-darts against the machines* to burn them. On his side the Duke (Godfrey) observing that the enemy had filled up the breaches with hay, wood, rags, and soft combustible matter, caused a great quantity of fire-darts to be shot, which set the whole in a blaze, and caused the fall of the city." These fire-darts, of which frequent mention is made in the chronicles of the period, were commonly supposed to be bolts or arrows, tipped with some burning chemical substance, and discharged by means of cross-bows or long-bows. This, however, must be regarded as erroneous, the use of fire-darts being, in some way or another, associated with the use of gunpowder. Mr. Hallam inclines to the opinion that the Moorish invasion of Spain caused the introduction of gunpowder into Western Europe. In the Escorial collection is a MS., by an Arabic writer, dated 1249,

* Used by the besiegers for battering the walls.

in which the use of gunpowder for war-purposes is distinctly alluded to. "It was long the custom," says Mr. Timbs, "to attribute the invention of gunpowder to our philosopher, Roger Bacon; but a passage in his *Opus Majus*, written in 1267, proves that instead of claiming the merit of the discovery, he mentions gunpowder as a substance well known in his time, and even employed by the makers of fireworks; and he minutely describes a common cracker. In his treatise *De Secretis Operibus Artis et Naturæ*, he says that from 'saltpetre and other ingredients we are able to make a fire that shall burn at any distance.' In another passage he indicates two ingredients, saltpetre and sulphur, and *lura nope cum ubre*, which is a transposition of the words *carbonum pulvere* (charcoal in powder). At the period when Bacon lived, Spain was the favourite seat of literature and art. Bacon is known to have travelled through Spain, and to have been conversant with Arabic, so that he might have seen the manuscript in the Escorial collection, which is at least as probable a supposition as that he saw the treatise of Marcus Græcus. Be this as it may, Bacon did not keep the secret long concealed; and in his later works he mentioned by name the various ingredients used in the manufacture of gunpowder. The alleged discovery by Schwartz occurred about fifty years afterwards."

During the fourteenth century repeated mention is made of the warlike use of gunpowder. It was used by the Moors in 1343, when they were attacked by the King of Castile. "The ships of Tunis had certain iron tubes or barrels, wherewith they threw thunderbolts of fire." The composition was also used by the English at the battle of Crecy, in 1346, and by the Venetians during a war with the Genoese in 1380. Much doubt has been cast upon the alleged use of gunpowder at Crecy; but the Rev. Joseph Hunter has contrived, by dint of patient investigation and careful research, to prove (from existing records) the actual names of those employed in the manufacture of the dangerous material, together with the quantities of saltpetre and quick-sulphur supplied to Edward III. previous to his departure for France. "On the 25th of November, 1346, the King issued a writ, commanding that all the saltpetre and sulphur that was anywhere to be sold should be bought. The total amount obtained was seven hundred and fifty pounds of saltpetre and three hundred and ten pounds of quick-sulphur." In the time of Henry VI., one John Judde, an enterprising merchant of London, was appointed Master-General of the Ordnance for life, in consideration of his having made, at his own expense, sixty guns, also "stuff for gunpowder of saltpetre and sulphur." During the siege of Constantinople in 1455, Ma-

hommed the Second is said to have employed mortars constructed of metal, and capable of throwing stone balls of two hundred pounds weight. "It was also"—says Colonel Anderson—"employed against Lorenzo de Medici, at a place called Fosso Cloidia, when all Italy made complaints against it, as a manifest contravention of fair warfare." This latter prejudice, combined with the imperfect manner in which gunpowder was prepared, in consequence of the want of proper granulating apparatus, fully accounts for the comparatively slow progress made by the invention in ancient times. It was rather as a combustible or explosive material, than as a propelling compound, that the use of gunpowder appears to have been known to the ancients. The Persians seem to have become acquainted with gunpowder through its being used, in the form of rockets, against them by an invading army, under the command of Sawah Shah. Teemoor, the celebrated Asiatic conqueror, seems to have used gunpowder during his conflicts with those who strove to oppose his victorious advances ; after which time its use, also the manufacture of rude kinds of ordnance, became common throughout the greater part of Asia. Nearly all the ancient Indian and Chinese travellers allude to the displays of fireworks witnessed in the various countries visited by them. So far back as the days of Greek literature, a Greek historian of Alexander's campaign in India

testifies that the Hindoos had the means of discharging flames and missiles on their enemies from a distance. It is incontestably established that gunpowder was used in India about A.D. 1200. In 1258, the Vizar of the King of Delhi went forth in state to meet the Ambassador of Hutaku, taking with him three thousand carriages of fireworks. In 1368, three hundred gun-carriages were captured in a conflict with the Indians, and some seventy or eighty years later (in 1482), cannon were found being used by the people of India. These arms were employed for naval purposes, shells having been used two years earlier by the sovereign of Guzerat. Other instances might be recorded. In the account of Major Syme's Embassy to Ava, in 1795, it is stated that the display of rockets witnessed on one of the state occasions in that country "was strikingly grand." "The cylinders of the rockets were trunks of trees hollowed, many of them seven to eight feet long, and from two to three feet in circumference; they were bound by strong ligatures to thick bamboos, eighteen or twenty feet in length; they rose to a great height, and in descending emitted various appearances of fire that were very beautiful." These were something like rockets!

In his "English Antiquities," Mr. Eccleston asserts that so early as 1411, the English both manufactured and exported gunpowder. This is confirmed by

Sharon Turner, who, in his "History of England," alludes to an order of Richard III. for gunpowder, contained in the Harleian MSS. Nevertheless, it was a very costly article; and so late as the time of Charles I., the train-bands found its dearness precluded its use by them. This arose, in addition to the causes above-mentioned, from the difficulty with which a sufficient supply of saltpetre, or nitrate of potash, was procured. In India, Arabia, and South America, saltpetre is frequently found forming an incrustation on the surface of the earth, while in colder countries it must either be imported or artificially produced. "Until the passage round the Cape of Good Hope was discovered," remarks Colonel Anderson, "gunpowder must have been an extremely expensive article of European warfare. A camel could hardly carry sufficient saltpetre for three hundred pounds of gunpowder." The quantity of saltpetre imported during the fifteen years ending December, 1866, was 5,384,919 cwt., amounting in value to no less than £7,963,008. The manner in which saltpetre found its way into Europe is ingeniously explained by Colonel Anderson. "The nitre of Bahar may have reached the west coast of India, thence been shipped to some port of Arabia, and thence carried across the Desert to Egypt; or it may have been conveyed in coasting vessels either up the Red Sea to Suez, or the Persian Gulf to the capital

of that country, on the Euphrates. On the other side, the nitre of Siestan would reach the Caspian, and thence be carried to the various districts of Asia Minor." From the heavy damp nature of the article, and its liability to be spoilt by rain, the cost of transport by land must have been excessive, almost reaching a point of prohibition, unless in small quantities as a matter of curiosity, or as a drug for medicinal purposes. Where no facilities exist for its importation, it has to be procured by artificial means. For instance, refuse animal matters, mixed with lime, are exposed to the air in heaps, and watered from time to time with urine and stable-runnings. Old parish registers make mention of saltpetre men, who travelled from parish to parish buying and selling this important substance. Licenses to dig for saltpetre were also issued by the Government to certain favoured individuals, who appear to have found it a very lucrative occupation. Shakspeare alludes to this in Henry IV., act 1 :—

“ And that it was great pity, so it was,
That villanous saltpetre should be digg’d
Out of the bowels of this harmless earth.”

The facility with which saltpetre is obtainable in India and China may account for the early use of gunpowder in those countries. Dr. Scoffern supposes that a fire lighted on a spot where nitre

abounded, must have attracted the notice of the most careless observer by its increased brilliancy of flame. Here was the dawn of the invention; the burning wood supplying the charcoal, the earth the nitre,—the result being a primitive kind of gunpowder, sulphur being afterwards used chiefly to assist the granulating process. Colonel Anderson, alluding to the belief that gunpowder was invented in India or China, thinks that “as saltpetre, its chief ingredient, is largely found in Bengal and to the north-west of India, and probably on many of the vast plains eastward, in the direction of China, this assertion has a probability well founded.” In another portion of his work, the same author says that in the early days of European occupation of India, “with native armies the powder-makers followed the camp; the women of families often manufactured the article for the match-locks of their husbands; such, too, at the present day is the custom in the wilds of Affghanistan, where the hand flour-mills of the huts are occasionally seen grinding the sulphur and saltpetre, to fabricate a coarse powder for the use of the men on their sporting occasions or plundering forays.” Near Calcutta, several native manufactories of gunpowder existed towards the close of the last century, and were declared by the local authorities to be unsafe and dangerous. The manufacture of Indian gunpowder was considerably

improved by the exertions of Mr. Farquhar, who, obtaining a contract from Government, established works with proper appliances for the production of a comparatively superior kind of powder. The systematic manufacture of gunpowder in England is, as we have already shown, of very old date. Part of the gunpowder factory belonging to the Messrs. Hall, at Faversham, was erected in the time of Queen Elizabeth. In his "Stories of Inventors and Discoverers," Mr. Timbs says:—"John Evelyn, of Wotton, Surrey, asserts that his ancestors were the first who manufactured gunpowder in England; but this must be regarded as the re-introduction. His grandfather transferred the patent to Sir John Evelyn's grandfather, of Godstone, in whose family it continued till the Civil Wars. As we stroll along the valley in which lies Wotton Place, we are reminded that upon the rivulet which winds through this peaceful region was once made the 'warlike contrivance.'" Evelyn, in a letter to John Aubrey, dated February 8th, 1675, says that on this stream, near his house, formerly stood many powder mills, erected by his ancestors, who were the very first that brought that invention into England; before which we had all our powder from Flanders. He also describes the blowing-up of one of these mills, when a beam, fifteen inches in diameter, at Wotton Place, was broken; and on the blowing-up of another mill lower

down, towards Sheire, there was shot through a cottage a piece of timber "which took off a poor woman's head as she was spinning." We suspect such explosions were extremely frequent, thereby tending to increase, especially in such superstitious times, the disfavour with which the manufacture of the deadly material was everywhere regarded. The powder manufactured by the Evelyns, and others to whom licenses had been granted, closely resembled that now in common use. Indisputable testimony shows that it was manufactured in the form of grains, an art probably obtained from Flanders, from which country much of the gunpowder previously used by us was obtained. This lends colour to the allegation that the Evelyns were the first who manufactured gunpowder in England, *corned* powder being meant thereby. Previous to the time of Elizabeth, the trade was an open one; but the menacing attitude assumed by Spain during the reign of that monarch, led to the English Government restricting the manufacture to the hands of those whom it could trust with the privilege. With improvements in the construction of firearms, the production of gunpowder continued to increase, until, becoming the chief destructive element in modern warfare, gunpowder now forms an extensive branch of industry in almost every country possessing a little knowledge of manufacturing art and science.

Gunpowder is, as previously mentioned by us, a composition formed from three different substances—saltpetre, or nitrate of potash, charcoal, and sulphur; and it is a most singular fact that, notwithstanding the immense progress made of late years in the various scientific applications of chemistry, no single substance has yet been produced or discovered which unites in itself the various advantages possessed, in their compound form, by the three ingredients requisite in the manufacture of gunpowder. The actual proportion of each substance used varies in different countries, but they approximate somewhat closely to what may be defined as a natural standard. From 65 lbs. to 80 lbs. of saltpetre, and from 9 lbs. to 15 lbs. of charcoal, are added to from 9 lbs. to 13 lbs. of sulphur, according to the country in which the powder is made. The smallest quantity of saltpetre is found in mining powder. In England the best powder is that made by or for the Government. Powder used for warlike operations generally contains about seventy-five per cent. of saltpetre. The saltpetre used in Europe is brought chiefly from Asia—principally from India and China, the value of the quantity imported by us during 1866 being £353,651. The value of the imports of saltpetre fluctuates largely. Thus in 1859 they amounted in value to £830,202; while two years afterwards, in 1861, this had sunk to £509,698. Sometimes a supply of salt-

petre is obtained from unexpected sources. For instance, a quantity of war-rockets, made for use during the Crimean war, were recently boiled down by the ordnance authorities, the result being the extraction of the saltpetre contained in them, and the preparation of the iron tubes for the reception of fresh charges. The saltpetre has to be properly refined before it is used, otherwise the foreign substances with which it is generally found largely intermixed would considerably impair its efficacy. The charcoal employed in Europe is obtained principally from the Dutch white willow, the alder, and the black dogwood. In Affghanistan, vine cuttings are sometimes employed. Old mahogany, deal, teak, and other woods are also found useful. On the quality of the charcoal, no less than on the purity of the saltpetre, depends much of the value of the gunpowder. Hence the care with which it is prepared, and the wood from which it is selected. The sulphur is obtained principally from volcanic districts. Much of that used in England comes from Sicily and the different countries of the Mediterranean; while in India the principal sources of supply are the Persian Gulf, Scinde, Sumatra, and Burmah. The three necessary ingredients—saltpetre, charcoal, and sulphur—having been obtained in a state fit for use, they have next to be weighed in proper proportions, dry-mixed, incorporated, pressed, granulated, sifted, glazed, dried, and

barrelled ; after which the manufactured gunpowder is ready for use or storage. The dry-mixing is performed in various ways. In Europe, a large tub, with a wooden stir-about, is used ; at Ishapore, Galloway's system of a revolving barrel with brass bullets is resorted to. But whatever method be adopted, it is essential that the ingredients should be in a perfectly dry and powder-like state. The *incorporating* process consists in adding a little water to the powder and carefully grinding it for several hours until it has obtained a slight consistency. At Waltham Abbey the grinding cylinders are of limestone, each weighing three tons. Two of these, weighing six tons, and making six or seven revolutions per minute, are employed for three hours in grinding a mass of composition, not exceeding forty-two pounds. The native manufacturers in China and India use a mortar and pestle in the absence of grindstones. After being properly ground, or incorporated, the powder is next *bruised*. This consists in picking out the hard pieces of cake, and working up to one consistency the smaller lumps by means of a roller and a metal-plate. The next step is that of *pressing*. Here the composition—now termed “mill cake”—is pressed into a hard but thin, solid mass. At Waltham, every five hundred pounds of cake is subjected to a pressure of six hundred tons. *Granulation* forms the next process. The cake is broken

into small pieces by means of toothed rollers, or by wooden mallets. This kind of labour is attended with considerable danger, as, indeed, are all the subsequent processes, the risk of explosion in each being extremely great. The powder is next *sifted* by means of parchment sieves, which separate the various grains; after which it is usually *glazed* by being shaken in a canvas cylinder, the larger grains, such as those used for Armstrong guns, being shaken up with a given quantity of black-lead. The *drying* process, which follows, is very hazardous. In India, the gunpowder is dried by being exposed to the heat of the sun; in England, artificial means, such as hot-air pipes, have to be resorted to, the temperature employed being about 140° Fahrenheit. After being thoroughly dried, the powder is finally barrelled and stored for use.

Explosions in connection with the manufacture of gunpowder are common. There is not a powder manufactory of any standing in the whole world which has not suffered more or less from this kind of disaster. We ourselves are familiar with such catastrophes in this country. Even the simple storage of the destructive material is fully as dangerous as is its manufacture. The Erith explosion affords a proof of this. The wonder is that such calamities are not far more frequent. How slight a cause may produce death and destruction is illus-

trated by the history of most explosions at home and abroad. Colonel Anderson relates how a small spark from a stove at Ishapore destroyed the works at that place. On another occasion, at Allahabad, a string of men were carrying barrels of gunpowder to the drying terraces. One of the barrels fell. Instantaneously, the whole of the barrels exploded, killing several of the men and severely injuring the rest. A recent instance is furnished by an Anglo-Chinese journal.* According to that paper a terrible explosion occurred on the 11th of December, 1867, at the powder magazines at Wachang. "A rush was immediately made for that locality. The site and a considerable area around were found covered with a mass of blackened and smouldering ruin. The streets were scarcely passable for the heaps of rubbish scattered about, and of every house there barely remained the broken and disjointed framework, tottering threateningly over a heap of tiles, rafters, floors, furniture, etc., mingled in one tangled mass below. Immediately upon and about the site of the explosion there was, of course, nothing left standing; but the numbers of charred and mangled corpses lying about presented a sickening spectacle. A curious feature in the extraordinary scene was the number of bullocks standing about among the ruins alive and

* The *Hankow Times*, December, 1867.

perfectly quiet, but utterly denuded of all hair, and in some cases of skin likewise. The amount of gunpowder lying in the Pao-gan-keuh at the time of the explosion was but trifling, for, as a rule, it is never kept there when made, but forthwith removed to the magazine, called Yung-gan-koo, which is distant some three hundred yards from the Pao-gan-keuh. A few days previous, this Yung-gan-koo is reported to have had stored in it 170,000 catties of gunpowder, or about one hundred tons foreign measurement; and curiously enough, although there was no communication between the two establishments, and the magazine was more carefully enclosed and isolated than the manufactory, the explosion at the Pao-gan-keuh by some means or other fired the Yung-gan-koo, and hence the third and most violent of the discharges. The loss of life is put down by the Chinese at fully eight hundred souls, but it is to be hoped that this estimate is above the mark. The origin of the accident, it is reported, has been discovered by the mandarins. A number of workmen, it appears, had been occupied with their usual employment in the Pao-gan-keuh, and then retired to the room allotted for smoking. One man, contrary to orders, returned to work with his pipe alight, but concealed under his cotton garment; and it was while he was shifting powder that his pipe is reported to have burnt a hole

through his robe, and caught some loose powder lying about him."

Explosions on a small scale in cities and towns are also frequent, principally in houses and shops where gunpowder is stored in limited quantities for use or sale. To give one case out of hundreds:—In the summer of 1867, a gunpowder explosion took place in an ironmonger's shop at Dowlais; several persons were severely injured, and the house and shop much shattered. The other day a similar explosion took place in a miner's cottage at Wigan, the whole of the building being destroyed. A few pounds of gunpowder proved the cause of the calamity. In mining districts, accidents from imperfect stowage of gunpowder are so numerous as to be taken as a perfect matter of course. The miners, also, from too close familiarity with the destructive compound, become careless, and disregard even the simplest precautions. Men have been observed with lighted pipes in their mouths, sitting on recently-opened barrels filled with powder, grains of which were strewn in all directions. On visiting a mining village, the first thing which attracts the attention of the stranger is the large proportion of forms marked with the effects of gunpowder. Here is a countenance studded with black spots; there is an eyebrow blown away; yonder is an arm stiffened and moving with difficulty; here is a hand with a finger missing; there is a face with

an eye destroyed, and so on through the whole of the dismal chapter. In the country mausion, too, accidents are almost as frequent. Now it is the accidental upsetting of a powder-canister; now it is the attempted drying of some powder which has become wet; now it is the falling of a spark from a cigar into a powder-flask; but be the primary cause what it may, danger to life and limb forms the inevitable consequence. The conveyance of gunpowder—notwithstanding the many precautions taken—is extremely hazardous. On Tuesday, February 26th, 1867, an explosion occurred on the railway near Penrith. A van containing gunpowder for conveyance from Manchester to Carlisle, blew up. A passenger train was passing at the time, and was much injured, the engine-driver and stoker being killed instantaneously, and several of the carriages badly shattered. The cause of the explosion is supposed to have been the friction of the powder in the barrels.

In the face of the facts above related, it seems almost incredible that the attention of scientific men should not have been directed to the question of depriving gunpowder of some of the dangerous properties which have so frequently rendered it almost as fatal to friend as to foe. Yet such was actually the case. Regarded at first by many as a chimerical idea, it was left for a sightless man to

demonstrate that there *was* a means whereby gun-powder could be rendered the powerless slave of its owners—a poor, weak, and harmless thing so long as they pleased that it should remain so—yet, at a mere touch, regaining, when required, its tremendous strength, ready to hurl to pieces the massive rocks which impede the progress of the engineer, or to spread death and devastation among the terrified armies of the invader.

CHAPTER XII.

There came a Giant to my door,
A Giant fierce and strong,
His step was heavy on the floor,
His arms were ten yards long.
He scowl'd and frown'd; he shook the ground;—
I trembled through and through;—
At length I look'd him in the face
And cried:—"Who cares for you?"

The mighty Giant, as I spoke,
Grew pale and thin and small,
And through his body, as 'twere smoke,
I saw the sunshine fall.
His blood-red eyes turn'd blue as skies,
He whisper'd soft and low.
"Is this," I cried, with growing pride,
"Is this the mighty foe?"

Mackay.

PUT AGAIN TO THE TEST.

WE have already described the character of Mr. Gale's invention for rendering gunpowder non-explosive and explosive at will, also the manner in which it was discovered; but to afford an accurate

idea of the real value of the new process, some few other details are necessary. The principle of Mr. Gale's invention is not unlike that of the safety lamp invented by Sir Humphrey Davy. "In each case," says a competent authority, * "the protection depends upon the suitable use of gauze wire, and in each case protection is obtained by dividing the explosive material and preventing it from burning or exploding in a mass." "When a spark falls on gunpowder, the particle touched is heated to the temperature of ignition, the nitre is decomposed, and its oxygen combines with the charcoal and sulphur; this combination extricates as much heat as is sufficient to inflame successively and rapidly the remaining mass, which then explodes."† If, however, the particles or grains can be kept separate from each other, by means of a non-combustible substance, such as glass flour, explosion, and even combustion, is rendered impossible. Did gunpowder really exist in the form of powder—as implied by its name—this, of course, could not be done. But gunpowder, as we all know, consists of small grains, which, when placed in a vessel, have a number of interstices between each other. If the grains be mixed with a substance much finer than themselves, these interstices would be filled

* *Journal of Royal United Service Institution*, Vol X.

† *Colburn's United Service Magazine*.

up, and each grain completely isolated from the others, the isolation being rendered more complete according to the fineness of the protecting material. The invention of Dr. Gale is based on the atomic theory that there is nothing so small but that there may be something smaller. Mr. Gale has most ingeniously availed himself of this fact. There are no grains of gunpowder so small that a smaller grain may not be found which can be easily mixed with, and readily separated from, the grains of gunpowder. The more thoroughly Mr. Gale investigated this principle, the more applicable did he find it to be ; and it is now well known that the mixture of a fine non-explosive combustible powder with gunpowder, will not only prevent it from exploding, but will actually prevent it from burning. It has, moreover, been ascertained that when properly prepared, this protecting powder can be instantaneously and completely separated from the gunpowder, which is thus restored to its original explosive condition." With the aid of the new machinery devised by Dr. Gale, *two* men can, if properly supplied, in ten hours separate one hundred tons of protected gunpowder, and have it ready for immediate use. Various substances are employed by Dr. Gale in forming the protective mixture, the principal being glass flour, which can be produced at a very low price. "The commonest glass is heated to a dazzling whiteness and then

plunged into cold water, which utterly destroys all the little fibre and elasticity glass can ever be said to possess, and renders it so friable as to be easily pressed to powder between the fingers. In this state it is placed in a machine shaped like a cask, in which are many small iron shots, and the machine being rapidly revolved for a minute or a minute and a half, suffices to reduce the glass to a powder so impalpable that even fine wheaten flour is coarse in comparison with it."* Mr. Siemens, however, suggests a new and improved plan, whereby the materials are made to pass into the furnace by means of hoppers, while the molten mass issues from it in a continuous stream. At the point of issue, the liquid glass is met by a strong current of steam, by which means it is finely divided, thereby producing a considerable saving in the cost of converting it into flour.

M. Piobert, in 1835, and M. Fadeieff, Professor of Chemistry at St. Petersburg between 1840 and 1844, are asserted to have anticipated in some measure the discovery made by Dr. Gale. Lieut.-Colonel Ryley, late of the Bengal Cavalry, also claimed to have discovered a process similar to that of Dr. Gale; but in none of these cases was the operation of the protecting powder so comprehensive or so complete as that devised by our sightless inventor. It is simply

* *Times*, June 22, 1866.

the old story. Let a man once make a discovery, and there will instantly arise a whole host of claimants to rob him of the honour and profit to which he is entitled. In Dr. Gale's case, fortunately, the facts were too clear to admit of question ; and for once, at least, an inventor has been allowed to reap the credit of his labours and ingenuity. It need scarcely be said that until Dr. Gale had completed his invention, he had never even heard the names of those to whom it was unsuccessfully attempted to attribute the discovery of the same.

The three principal difficulties to be contended with in the carriage and storage of gunpowder, are its liability to danger, damp, and dust. These three words describe the three most serious evils by which the carriage and storage of gunpowder are always surrounded. Dr. Gale's process, however, by one operation provides a remedy for each of these drawbacks. Once protected by the glass-flour and other materials, gunpowder becomes absolutely non-explosive and non-combustible until it is separated from the protecting medium. The advantages of this are observable in various ways. Not only does it afford a means of removing the danger of explosion from the Government magazines and other places where powder is stored in large or small quantities, but it also tends to remove a source of much disaster and loss among our shipping. There are few vessels

trading between this country and the colonies which do not carry a larger or smaller quantity of gunpowder. The quantity may be only a few pounds—it may be two or three hundred barrels; but in every case the risk of explosion is imminent. “When it is remembered”—observes the *United Service Magazine*—“that the safety of the crew, to say nothing of the ship, depends materially on the care with which this dangerous and treacherous article is stowed, and that, in all probability, considerable numbers of missing vessels have totally disappeared in the midst of the ocean, in consequence of having gunpowder as part-cargo; we cannot but express surprise at finding that neither ship-owners nor underwriters draw any, or at any rate little, distinction between ships laden with powder and those carrying ordinary goods.” If the gunpowder on board were protected, all risk would be avoided. On board our war-vessels the precautions observed with respect to the stowage of gunpowder are extremely numerous, and at times very inconvenient. Ships of war having powder on board are not allowed to enter English ports or harbours, save by special permission, and then only on the condition that they do not remain longer than four days. When gunpowder is being taken on board, tobacco-smoking is not allowed; fires and lights have to be extinguished; even—if the vessel be one propelled by steam—the engine furnace has

to be put out. All this entails a vast amount of expense. The transit of gunpowder from one place to another is also attended with considerable trouble and cost. Gunpowder conveyed by rail—say from Manchester to Edinburgh—has to pay largely increased carriage rates, to be brought to the station at a particular time, conveyed by a special train, and subjected to many troublesome regulations. This has naturally given rise to a large illicit traffic in gunpowder. It has been stated that it is sent both by water and rail under other names, and, consequently, without paying those heavy rates which it ought to pay; thus passengers, both by ships and railways, are exposed to a danger by the present system which they ought not to incur. A gunpowder manufacturer, a short time ago, naively remarked, “We prefer sending our powder out to sea in a barge, and then put it on board ship, in order that it may not appear in the vessel’s manifest, so that we may escape the high rate of insurance, and those heavy charges which would be incurred if we put it on board in the docks.” This appears to be a regular practice with regard to the gunpowder trade. Another gunpowder manufacturer has positively asserted that it cost him no less than £2 per ton to meet the regulations which were imposed by the Railway Companies and Dock Companies in London, in getting gunpowder from his works, which were near the

docks, on board the ships. He said, if these restrictions could be abolished he should at once save £2 per ton. If a ship takes but a small quantity of gunpowder, the insurance rate to which she is subjected is largely increased. Four hundred tons of gunpowder have been known to be conveyed at one time by a single ship. A ship-owner, who was formerly a captain, told Dr. Gale that on one occasion he took on board twenty tons of gunpowder, and during a voyage of three weeks he suffered so much from anxiety, that he determined never again to ship such a dangerous article.

By the adoption of Dr. Gale's process the whole system becomes changed. The protected gunpowder can be carried about like ordinary merchandise, and at the same cost. Nor is there any fear of the protecting mixture becoming separated from the gunpowder if the packing be duly attended to. This is proved by the result of a remarkable experiment carried out by Mr. Handel Cossham, of Bristol. That gentleman, in August, 1865, took with him to the United States a large box of protected gunpowder, which was given into his charge at Liverpool. This box was placed in the hold of the *Scotia* steamship, where it was subjected to all the rolling and tossing of over three thousand miles of sea-voyage. At New York it was tumbled about in a most uncere-
monious way, and subjected to the test of a very

rough ride in a cart without springs through the streets of New York. Mr. Cossham then took it with him for several thousand miles by railway through the various States. The roughness of the transit was very great. Mr. Cossham could compare it only "to being drawn over a saw the wrong way." At the end of these voyages and journeyings, the box was opened and the gunpowder therein found to be as completely protected as on the day it left Liverpool. A somewhat similar experiment was made in the early part of 1866, by the military authorities at Woolwich, in obedience to instructions from the War Office. One hundred pounds of protected gunpowder was travelled one hundred miles, and then carefully examined at the Royal Laboratory at Woolwich, when the result showed that, although carelessly packed and scarcely filling the barrels, the tendency to sift was extremely slight.

It has been objected that the increased bulk of the protected powder—three pounds of the protective mixture being required for every pound of powder—forms a serious drawback to its utility. This, however, is more apparent than real. The cost of carrying a ton of gunpowder by rail is—let us say—£6; the cost of carrying four tons of protected powder would be £3, showing a saving of £3, or one-half per ton, to say nothing of the immense diminution of trouble, risk, and inconvenience. This diminished rate

is of course the result of the non-liability to risk with gunpowder so protected. Mr. Grant, of the Great Western Railway Company, recently stated that at present that company, like others, had to construct very expensive magazines for the purpose of transporting gunpowder by rail; but if Mr. Gale's process were adopted, it would become a question whether those expensive travelling magazines might not be discontinued. Among several others, Mr. Cockshott, assistant manager of the Great Northern Railway Company, expressed himself very decidedly in favour of giving very moderate rates for the carriage of this gunpowder, feeling sure that the development of Mr. Gale's process would be very greatly to the advantage of the Railway Companies, inasmuch as at the present moment very little is sent by rail, and even the little that is sent they would rather be without, because they do not like to have to carry such a dangerous article. By resorting to Dr. Gale's process, says Mr. G. P. Bidder, in his Report dated 1865, "the compound may be transported either by common carriages, by railway in ordinary trucks, or on shipboard, in any quantity, with absolute safety; and, indeed, it is infinitely less objectionable than many articles of commerce, such as coal, cotton, wool, hemp, &c., whether when stored away in ordinary sheds and warehouses or in course of transport." The cost of the protecting mixture,

too, is capable of being lessened, by reason of its utility, after being separated from the powder, either by re-use, or for scouring and other purposes, for which fine emery plate powder and similar impalpable substances are used.

It is almost impossible to compute the many advantages and facilities afforded by the use of Dr. Gale's invention. In the item of insurance a considerable saving will be effected. Mr. Thomas Piper, surveyor to the North British and Mercantile Insurance Company, London, reporting to the company the result of his investigation of Dr. Gale's process, stated that it was evident that gunpowder so protected "is quite inexplosive and almost unflammable, and in this form may with perfect safety be stowed away among ordinary merchandise, without risk." Also, that he is "prepared to recommend the various insurance companies to allow gunpowder so protected to be stored away in buildings of all kinds, without any further or additional rate of insurance." At the present time, insurance companies, one and all, altogether refuse to insure buildings in which gunpowder may be placed, however large the rate of insurance offered. Gunpowder itself has never been insurable. We believe that a person keeping more than one pound of gunpowder on his premises cannot, if the fact be known, be insured at all. The legislature has now, says Mr. Bidder, "the means of dictating a

mode by which all public alarm as regards the transport, storing, and housing of gunpowder may be set at rest." The adoption of the protecting process in the Government magazines would be attended with a saving of many thousands annually. The present system of gunpowder storage is necessarily very costly. Special arrangements have to be made for preserving the powder from risk of ignition or damp. "The places in which it is kept are generally far apart from others ; and large sums of the public money are frequently expended in order to allow the powder to be kept in any considerable quantity at any one spot. The land on which the large powder mills are constructed is necessarily much larger than it would be required to be for the stowage of ordinary stores ; and thus a large additional expense is required at the very beginning. The sheds, workshops, &c., are built specially for the purpose ; and the men employed in them are paid much higher wages than ordinary labourers. The establishments at Marchwood, Purfleet, Upnor and Priddy's Hard, are comparatively much more expensive than any of the others belonging to Government."* Under Dr. Gale's system, the whole expense of storage, etc., would not exceed the annual cost of the powder barrels alone.

* *United Service Magazine.*

It has been alleged that gunpowder thus protected loses some of its propelling force. This is an erroneous idea. Powder which has been protected has been used in firing segment shells from a twelve-pounder breech-loading gun at Woolwich. But the difference in velocity between the protected and non-protected powders was very slight, being scarcely appreciable; certainly not more than that observable in portions of gunpowder of the same manufacture. In fact, so little is gunpowder affected by the process, that, according to Mr. Bidder—"On mixing ten pounds of gunpowder with forty pounds* of protecting powder, and separating them again, there was not even the turn of the scale to indicate any loss or gain of weight in the gunpowder." The powders were remixed and separated upwards of fifty times, and with the same result.

Dampness is a frequent source of deterioration in gunpowder, speedily rendering it unfit for use. The atmosphere quickly penetrates the contents of a barrel and finds its way to every grain, which, absorbing the moisture of the air, becomes useless. The fineness of the glass-flour used by Dr. Gale prevents the air coming in contact with the grains, and tends to keep the powder in its original condition. A very interesting and instructive illustration of

* Only thirty pounds are actually required.

this is related by Mr. Kingsbury. Having been supplied with a bag of protected gunpowder, he took it and placed the same in a damp cellar under his own house, which was reeking with wet. He put it in a position in which no ordinary gunpowder could remain without being spoilt in a few days. He left it there, intending to leave it for six months, but his curiosity got the better of his determination, and after it had remained there five months, he went down to look at it, and he found the bag was so rotten that he could thrust a finger into it. He opened it and took out a portion of the gunpowder, dried it before the kitchen fire, when he found the powder as good as ever it was." It is not often that gunpowder—protected or otherwise—is stored under such unfavourable conditions; but, again quoting Mr. Bidder, "Should the compound become damp by being stored in exceptionally moist places, or by accident, it may be safely dried by being baked in an oven, or, without special precaution, in any other way, as no amount of heat can give rise to an explosion." The importance of this will be perceived when it is remembered how America and other countries are large sufferers in the way of gunpowder injured by damp. In America they have periodical sales of damaged gunpowder, sometimes five hundred tons at a time, which brings from 2d. to 3d. per

pound. Our own Government have occasionally to adopt a similar course.

Dust is another fertile cause of mischief. It is found by experience that gunpowder cannot be packed closely in barrels, because if it is packed thus it will all cling together. It must be allowed scope for moving or shifting, otherwise the grains would adhere to each other. The least friction causes the grains to rub, and the consequence is, that a great deal of dust is created. In the Government packages one-fifth of the space is unoccupied by powder; that is to say, that the packages containing powder which the Government receive have only four-fifths filled with powder, and one-fifth remains vacant. From the danger alluded to, Dr. Gale's process protects gunpowder, because, when his system is adopted, a barrel of gunpowder can be packed perfectly tight and prevented from shifting in any way. Each powder barrel is capable of holding one hundred and twenty-five pounds of gunpowder, but not more than one hundred pounds is ever put in. Weight for weight, the bulk of the glass-flour is smaller than that of the gunpowder, so that the requisite quantity can be put in each barrel, without diminishing the bulk of the gunpowder. The glass-flour, being extremely fine, works itself into the interstices between the different grains, completely enveloping each and thus protecting it from the action of the external air.

The barrel is, of course, packed perfectly tight. Some might object to this, but it is just what is required, because the glass-flour prevents the grains of gun-powder from rubbing against each other and becoming dust. From the preceding observations, it will be seen that the existing powder magazines would not have to be enlarged for the purpose of containing the large quantities of glass-flour, etc., necessary for the proper protection of the gun-powder; the space at present left unoccupied, in consequence of its being necessary to keep the powder in barrels and in a loose state, being amply sufficient for the purpose.

We might fill page after page with similar details, but enough have been given to show the value and utility of the invention with which Dr. Gale's name is associated. That before long it will have come into general use is almost a certainty. Mr. G. P. Bidder expresses himself strongly on this point. In a report prepared by him in 1867, two years subsequent to that previously quoted by us, he remarks that:—"With all new discoveries, and especially those of the character of Dr. Gale's invention, a certain time is necessary to make them thoroughly known and appreciated by the public." He is, however, confidently of opinion that, with ordinary prudence, patience, and a careful working of the invention, it will prove successful and remunerative.

Of the merits of the process, Mr. Bidder, like all scientific men who have become acquainted with them, speaks in almost eulogistic terms. It is one of those inventions, the true value of which will be more understood by future generations than by the present, although, to their credit be it spoken, the English Government have not been slow in their appreciation of its importance; nay, are more than likely to avail themselves of the numerous advantages which repeated tests have shown it to possess. Already, at their express request, Dr. Gale has personally visited the magazines at Purfleet, Southampton, and elsewhere, for the purpose of officially reporting thereupon; and he is now busily engaged in the erection of suitable machinery, which, when complete, will enable his invention to be worked on the most practical scale. In a report recently drawn up by Dr. Gale, at the request of the War Office authorities, he states that instead of his process involving additional outlay, as had been reported, it will actually effect a saving in every department of the service connected with gunpowder. The present system of storing in barrels would be dispensed with, as the sums now expended on barrels alone would be more than sufficient to effectually protect all the gunpowder in the kingdom. The national efficiency of the protective process is considerably increased by the use of the improved mixing and separating

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machines, by the aid of which four men can supply gunpowder ready for use as fast as it is required in any of the Government magazines yet visited by him.

CHAPTER XIII.

“ — Yet much remains
To conquer still ; Peace hath her victories
No less renown'd than war.”

Milton.

“ All is of God ! If He but wave His hand,
The mists collect, the rain falls thick and loud ;
Till, with a smile of light on sea and land,
Lo ! He looks back from the departing cloud.”

Longfellow.

THE BLIND INVENTOR STILL AT WORK.

WE have traced the life and career of Dr. James Gale, from the time when, blessed with the possession of sight, he participated in the boyish sports of youth amid the romantic scenery surrounding Tavistock, to the auspicious moment when, no longer endowed with the wondrous power of vision, he found himself almost compensated for the great and terrible affliction which had befallen him, by the consciousness that he had become ranked with those who have deserved well of their country. Very interesting and instructive is such a history as that

recorded by us, and we sincerely trust that its teachings will not be wholly thrown away upon those who, from infirmity, poverty, or some other equally depressing cause, too frequently lack that strong spirit of patient perseverance, without which none can hope to rise, but with the aid of which even the poorest, the weakest, and the most lowly may aspire to something better, to fill a bright and honourable—or at least useful—position in the great world in which they live.

The inventive mind of Dr. Gale, as might be supposed, was seldom found at rest. Ever busy and energetic, it was perpetually scheming something new, something which should be an improvement upon that which was already in use. In this manner, fresh inventions were constantly coming to light. Some of these were of a comparatively slight description; others were of a most important character. Among these latter may be mentioned the Ammunition Slide and the Rudder Ball Cartridge, both of which have successfully withstood the most critical experiments which the ingenuity of scientific men could possibly devise. It is difficult, without the assistance of diagrams, to explain the character of a new mechanical contrivance; but we shall perhaps be enabled to render ourselves somewhat intelligible in attempting a description of these two inventions. One of the principal objects in all modern improve-

ments in firearms is to ensure increased rapidity in loading and firing. It will be remembered that it was the superior action in this respect of the needle-gun which gave the Prussians a decided superiority in their contests with the Austrians. Since the Battle of Sadowa, however, great advances have been made by other countries—notably England, France, and America—towards perfecting the utility of the various descriptions of firearms used by them. Dr. Gale's Ammunition Slide Gun forms, however, the most decided step recently made in the direction of absolute perfection. The principle and working of the invention are very simple. The weapon forms a kind of skeleton firearm. The stock, barrel, and hammer are in their accustomed places, but where the common revolver has its circular breech for the reception of cartridges, Dr. Gale's gun or pistol contains a blank square-shaped space for the reception of a horizontal metal slide, of very simple yet ingenious construction, enclosing the cartridges. As the cartridges are fired one by one, the slide, by a self-acting mechanical action, passes on through the hollow space in the stock, until the last cartridge having been used, a fresh slide filled with cartridges can be instantaneously employed. In this way one hundred and forty shots per minute have been actually fired by Dr. Gale in presence of the Duke of Cambridge. Each slide contains ten or more

cartridges, and is entirely distinct from the firearm. The process of reloading the slides is extremely simple and safe, a child being enabled to perform the task with ease, and to keep the firer fully supplied with ammunition. Of the value and efficiency of the invention, there has been expressed but one opinion. The *Mining Journal* declares it calculated not merely to increase the fame of Dr. Gale, but "to prove of enormous advantage in the science of warfare," a sentiment echoed by nearly every practical scientific writer. The *Morning Herald*,* assuming that the weapon would discharge sixty shots per minute, says that, armed with weapons on the Gale principle, "a single regiment of infantry would literally and absolutely pour forth a veritable storm of bullets; for, assuming such a regiment to be eight hundred strong, it could certainly throw forty-eight thousand bullets in the face of its enemy in a single minute of time; and as few men would relish facing a body of weapons which gave him sixty shots a minute as his own particular chance of death, with a reasonable probability of an extra and large percentage of chances against him as his comrades fell, we only hope that this invention may be an additional link in that chain of destructive powers which may in the end make war too dreadful a game for nations

* May 16th, 1866.

to play at." Taking, however, one hundred and twenty shots per minute each man, the discharge of the eight hundred soldiers would be 96,000 per minute, or 5,760,000 per hour! Could anything more destructive, more terrific, be imagined than this appalling hell-storm of death? A regiment thus armed would almost be enabled to annihilate an entire army of opponents. Strange, is it not, that a blind man should have been the inventor of such a terribly destructive weapon? It seems almost a paradox: "What pleasure, it may be asked,"—remarks a metropolitan journalist,—“can a benevolent man have in devising means of destruction for his fellow men?” The reply is furnished from the same source.* Dr. Gale “believes sincerely that the time is rapidly coming when new inventions will make war such a scene of mere carnage that nations, as by one consent, will drop their weapons with a shudder.” He furthermore is of opinion “that the development of science will so place smaller forces on a level with larger, or will so expose heavy masses of men to certain destruction, that the great powers which now delight in war will gladly cease to dream of such a mad crime.”

This invention of Dr. Gale bids fair to become the parent of many others, the principle being applicable

* *Morning Star.*

to almost every description of firearm, even to cannon of the largest calibre, and more than one writer has hinted that it may possibly be found the means of solving the knotty problem of big guns. "Given a thick armour plate, it requires a heavy gun to cope with it; but the thicker the armour and the heavier the gun, the more unwieldy the vessel." Dr. Gale brings another principle also into play. It is acknowledged by all experienced men that where one great bolt might with a single blow inflict irreparable damage upon an iron-plated adversary, there exists at present considerable difficulty in giving that blow at the right time and in the right place, because of the huge, unwieldy nature of the guns, which renders their proper adjustment at times almost impossible. Dr. Gale is not an advocate for such extremely heavy ordnance. He trusts more in guns of less weight, throwing a multitude of shot with immense rapidity, the entire volley striking one particular spot when the proper range has been once obtained. Certainly, it is highly probable, if not positively certain, that continually repeated blows with a hundred-pounder would be more calculated to batter in the sides of an iron-plated vessel than would be the most tremendous blow given singly from a six-hundred pounder. Should this prove to be the case, some startling changes in our military and naval systems would inevitably ensue. As an intelligent writer truly

observes :—" The principle is one which may possibly lead to a great reduction in our heavy military expenditure. One soldier armed with a weapon on Gale's principle, would be equal to ten provided with the Enfield ; and it is cheaper for us to lay out money on perfect weapons than to maintain huge battalions."

The Rudder-Ball Cartridge invented by Dr. Gale is not less ingenious than is the Ammunition Slide. It is made of paper washed on both sides with an explosive fulminate, twenty-five per cent. stronger than gunpowder. The mode in which the cartridge acts has been thus described. A strip of the prepared paper is taken. Now, "suppose this strip coiled round the shank of a common round-headed hob-nail, and a percussion cap stuck on the point of the nail. Such is Dr. Gale's cartridge in its primitive form." If a pistol were fixed in a vice, the hob-nail would hit truer than a common bullet. Well, the new cartridge contains a bullet not much unlike a hob-nail in appearance. The lever attached to the ball assists in causing it to fly perfectly straight. "The rudder-tail"—we are told—"converts it into a short dart, and the leverage of the shaft must act upon the air without cessation, and keep the point always straight to the mark."* The principle is simple. "Watch a swallow ; it spreads and straightens

* *Standard*, November 29th, 1866.

its tail as it takes a floating sweep, and the like intuitive action is seen in the fish, and every quick moving animal. The arrow, the dart, and the javelin, are all examples of the straightness of direction which the shaft or lever gives to the weapon ; and that the idea was not sooner applied to military bullets is, perhaps, very singular, although not more singular than that the idea should have been conceived in the mind of a sightless man, instead of one accustomed to watch the motions of air-borne objects."

The new cartridge can be used with almost any description of gun, whether smooth-bore or rifle ; but, theoretically, it would be found most effective if used with the latter. The idea appears to be as simple as it certainly is ingenious, and will probably prove the forerunner of a long series of valuable improvements in this direction. The explosive compound used by Dr. Gale in preparing the cartridges is of a liquid nature, and composed, we believe, of chloride of potash and other substances. In the mixture thus formed, linen, paper, and other fibrous materials are placed until they have become thoroughly saturated ; after which they are carefully dried, rolled up, and cut into cartridges of various dimensions and lengths, as may be required. In this manner, cartridges of any size can be produced with great facility. Nor is the invention, so far as the cartridge is concerned, applicable to military purposes alone. For

mining and similar operations, it is most effective, especially when used in the way proposed by Dr. Gale, who, taking a cartridge roll measuring—let us say—ten inches in length by one or two inches in diameter, pushes it into the blasting hole, or perforation, made by the miners, when it is ready for firing, its efficiency being in nowise impaired by any moisture which may have accumulated in the opening, and which, otherwise, would have proved a source of danger. In fact, the new cartridges are perfectly waterproof, and, unlike those in which gunpowder is employed, are not injured by being exposed to the action of moisture. Most of the untimely explosions connected with blasting operations have taken place during the process of ramming the gunpowder tightly down into the blasting-hole. By using the new cartridge, this dangerous process is entirely avoided, and all risk of uncertain explosion averted. The manufacture of the cartridges is unattended with hazard, and the cost of production does not exceed that of gunpowder. Some idea of the comparative explosive force of Dr. Gale's invention may be formed, when it is remembered that in the ordinary Enfield rifle cartridge two and a half drachms of powder are required, whereas the rudder-ball cartridge will perform the same amount of work with one and three-quarter drachms of the new material; a very important difference, when the cost and difficulty of

transport of war materials in active service is considered. The new cartridges have a clean and finished appearance, and Dr. Gale states that when he has completed his arrangements for the hermetical closing of the chambers of all breech-loading rifles, all mechanical agencies for extracting the empty cartridge-cases after firing may be dispensed with, an advantage confessedly of no mean character to the soldier in actual practice.

The Fog-Shell is another contrivance emanating from the fertile mind of our blind inventor. Filled with a chemical compound, it will, when thrown on the upper deck of a ship, generate a vapour so dense and impenetrable, that while it lasts the various sailors and marines on board that particular vessel, unable to discern any object not immediately close to them, find it impossible to defend themselves with any degree of certainty. On the other hand, it could be as effectually used for purposes of defence, or to cover a retreat. The Balloon-Shell, also an invention of Dr. Gale's, is of another character altogether. The shell, which may be made of any size required, is filled with a fulminate which requires a fall of at least one hundred feet to explode it. By slightly altering its internal arrangements, it may, however, be made to explode on being dropped from a much lower height. A mere blow from a hammer or a slight fall would not, however, be sufficient to de-

tonate it; hence the comparative safety with which the storage or transport of a supply of such missiles would be attended. Once ignited, the contents of the shell are anything but harmless. Indeed, so fearfully destructive is the character of the explosive compound employed, that the contents of a nine-inch shell would instantaneously clear a space of several hundred feet of all but extremely ponderous objects. It is more than probable that this invention may assist in causing the utilization of balloons for military purposes. Such, at least, is the opinion of Mr. Coxwell, the aeronaut, who, in a recent lecture, expressed his earnest belief that by converting balloons into machines for dropping shells, such as that devised by Dr. Gale, upon a hostile army, they might be rendered most dangerous and effective instruments of warfare, especially when employed against an invading expedition. Mr. Coxwell seemed to have much faith in Dr. Gale's invention, for at the close of his address he remarked that he trusted there was no danger of the recurrence of war in Europe; but if there was, he would remind foreign nations "that the country which had produced an Armstrong, a Whitworth, a Gale, and a Boxer, might also produce a man capable of discovering terrible aerial agents of destruction."

But not alone to inventions of a military character has Dr. Gale confined his earnest attention. The

practical use of electricity for common purposes has long engaged his closest thoughts, leading to several inventions of a highly characteristic nature. Among these is an Electric Alarm Clock, by the aid of which a person may be enabled to wake at any hour he pleases. Another contrivance is the Electric House Guard, or Fire and Thief Detector, by which not only is due notice given of the sudden outbreak of a fire on any part of the premises, but also the exact locality endangered. In the same way the entry of a midnight intruder is instantaneously signalled, the door or window by which he entered indicated, his progress through the house carefully marked, and his presence at the plate-chest or safe accurately ascertained. By this means a person is enabled to take precautions for the capture of the intruder, or, if necessary, quietly to leave the house, without giving an alarm to the thief, for the purpose of procuring assistance. We might describe various other equally ingenious contrivances, but enough has been given to show the fertile and constructive character of our blind inventor's mind, which, ever busy, is constantly producing new inventions or discoveries of a more or less useful nature. The Rev. B. G. Johns, alluding to Dr. Gale, says, "he is probably one of our shrewdest men of science, and a first-rate analytical chemist; but in no sense to be counted as a blind man."* This is a curious assertion,

* *Blind People: their Works and Ways.*

but Mr. Johns gives his reasons for making it. According to him, Dr. Gale, having laid up all his wonderful store of knowledge while he yet possessed the power of eyesight; having acquired all his skill as a manipulator while he had the full use of a pair of eyes, was not to be driven by blindness alone from the position which he had achieved. He might take rank with such men as Fawcett or Prescott, but he is not justly to be cited as a blind man who had won his laurels under "the cloud of ever-during dark." Perhaps when the author of "Blind People: their Works and Ways," has perused these pages, he may think fit to modify his opinion. Many have been the eulogiums received at various times by Dr. Gale; but perhaps the most flattering and appropriate of all were the following lines, which were written by a lady, a native of his own beloved county—Devonshire; and which we feel assured will not be here considered as out of place.

" Oh, fair young Day! How vainly at the portal
Dost thou beseech an entrance! Darkness there
Keeps court, beneath the eyelids of a mortal;
The only guests within are Night and Care!
He knows thee not, when in the morning, beaming
Over the hill-tops, in the gorgeous east;
He knows thee not, in thine effulgence streaming
Straight from the southern heavens;—nor can he feast

On all thy pageantry, when thou, retiring,
 Seekest the chamber of thy royal rest,
And all the world looks on, to see, admiring,
 Thy gleaming banners floating in the west!

Oh, blithe young Beauty! fruitless thine endeavour!
 Not even thou canst penetrate the gloom;
The gates are closed to thee and thine for ever,—
 Away, bright Sprite! in other glances bloom!
He knows thee not, Oh, Being all celestial;
 Perchance he hears thy pinion wafting by,
And voices tell him, in this globe terrestrial,
 How many things are 'neath thy sov'reignty!

Nay, come not, Nature, he may not behold thee!
 This dweller in the phantom-peopled night;
He hears thy voice—he loves thee—but has told thee
 That charm of thine shall ne'er rejoice his sight.

Oh, Art divine! bring not thy glories hither!
 Oh, Science! lay no trophies at his feet!
The greenest laurels, in your crowns, will wither,
 E'er these dim orbs one great achievement greet.

Sweet, sweet Compassion! raise thy voice in weeping;
 The Dweller-in-the-Darkness ne'er may know
Thy loveliness, when glitt'ring tears are creeping
 Adown thy cheeks, and when thy head is low.
Weep, sweet Compassion, weep! tho' eyes as tender
 As gentle Leah's beamed upon his own,—
No answering grateful glances could he render,
 Life's Light and Loveliness are both unknown."

“Nay, weep not, gentle spirit, tho’ the portal
Of these mine eyes is closed for evermore
To all things of the earth; the things immortal,
Have power to pass within the sealèd door.
I know no gloom—but Day the sempiternal,
Brought by Imagination to my sight;
Bright are her smiles, and all her charms supernal,
And never fading in the shades of night!
Mine is a land of beauty—past conceiving
To all whose mortal eyes alone can see;
The mind has vision; Fancy’s tissues weaving,
I cannot contemplate Deformity.

Tell me the glories of the day’s declining!
Name me the tints that crowd the western sky!
Crimson and opal—gold and purple shining;
Who, who can see them half so well as I?
Yes, mine’s a dreamland splendour—where is sinking
A brighter sun beneath enchanted seas;
And all its brilliant images are linking
My soul, with Heaven’s unseen realities!

Knew *he* not Loveliness, whose song, aspiring,
Told of God’s Paradise, in days of yore?
All earth shut out, no mortal sight requiring,
Imagination op’d the golden door.
Knew *he* not Nature, who so well depicted
Eden’s glad garden, where the streamlets play’d,
Its flow’rs and trees,—with one, the interdicted;
And Eve, our mother, ’neath their grateful shade?
Had not his eyes been seal’d, his fancy’s pinion
Had flutt’ring dropp’d, e’er reaching such a height.
Man’s mind the sceptre holds, and bears dominion,
And blindness fails to constitute a night!

'Tis Ign'rance makes the darkness; where, united
To total loss of sight, she fills the throne—
Then is there night indeed; and so, unlighted,
The soul in slumber sinks, unheard—unknown!
Yet, needing but the voice of Education,
To rise, awaking like a willing maid,
And set herself about her occupation;
For tho' without the house is wrapp'd in shade,
With shutters closed, and sad the air pervading,
Yet Knowledge maketh all the chambers bright,
Decking them out with branches never-fading,
While young Imagination holds the light.

Oh, my blind brethren, ye whose souls have slumber'd,
Have I not labour'd gladly for your sakes?
How many happy ones may now be number'd
For whom the morn of joy and beauty breaks!
In a fair sea-port of the West I've founded
A pleasant home, where many of ye dwell,
By every kindly influence surrounded;
For I would have ye taught to do as well,
As most of those who share not our condition;
Have we not wondrous subtilty of touch?
Keen sense of bearing? mental intuition?
To compensate our loss, God gives us much.
So out to you my helping hands I'm reaching—
Stretch out your own—have faith—and ye shall find
That by the aid of sympathetic teaching,
Out of the ditch the blind shall lead the blind!

And Science favours me. Her wondrous teaching
She holds not back, because her child is blind;
A fadeless wreath her hand to me is reaching,
May I but grasp it on my brows to bind.

She talks to me, in midnight meditation,
Of miracles that she will yet achieve ;
She fills my soul with schemes for contemplation,
Teaches my mind to wonder—yet believe !
Oh, mighty Science ! evermore progressing,
The secrets of thy future, who may show ?
Knowledge, dominion, benefit, and blessing,
On all the human race thou dost bestow.

We read of monsters, in our early hist'ry,
Great wingèd dragons, breathing smoke and flame ;
Scaly, voracious, awful ; full of myst'ry.
Spreading destruction wheresoe'er they came ;
Making wives widows ; children orphans ; burning,
Devouring, slaying, whether man or beast ;—
And valiant knights went out against them, spurning
Them low with spear-thrusts ; then the terror ceas'd

These were but prophecies of our condition ;
For there are monster-powers, that make a toy
Of man ; and tho' to serve him is their mission,
Yet like the ancient dragons, they destroy.
And one above the rest—a treach'rous giant,—
Seeming quiescent—and a willing slave,
But to rise suddenly in wrath defiant,
And crush his myriads in a common grave !
In the night-silence—bursts his voice of thunder !
Mocking the shrillness of his victim's cry ;
He rends his prison walls in rage asunder,
And all our puny homes in ruins lie !
How the earth trembles ! while the echoes, waking,
Pass the sad tidings on, from hill to rock ;
And wretched mortals, in their terror quaking,
Seem to have lost their reason in the shock.

He gives no warning—but a spark alighting,
Heats him to fury in a moment's space,
Then he bursts forth in flaming fire, affrighting
And slaying all the helpless populace!

Shall we then follow him, with stern persistence,
And wage against the beast a bold crusade,
Crushing for ever out his dread existence,
So that henceforth we need not be afraid?
Ah no! we may not, for his strength stupendous,
Is needful to us both in war and peace;
To him we look from foeman to defend us;
His herculean labours wealth increase

Where is Delilah? we would have her serve us,
This modern Samson, who has all defied;
She still may find the secret to preserve us,
Tho' futile every bond we yet have tried!
Has he not broken them as tow asunder,
Rampant at fire, as tigers are at gore?
Where is the yoke that we may cast him under,
And hold him safe in bondage evermore!

By me Delilah speaks—we call her Science—
And she has chosen me to curb his strength;
Rejoice mankind! no more he breathes defiance,
For the untamable is tamed at length!
Science has armed me; fill'd my soul with daring;
Whispered the secret of a sure success;
Shall I not go and conquer? homeward bearing
The guerdon of a nation's thankfulness!

When my Great Father sent my deprivation,
I thought my life thenceforth a blank must be;
But soon came down the angel Resignation,
And she and Time brought Cheerfulness to me.

Then made I this resolve, with God's assistance,
My life should bear him fruit, as men's that see ;
Not like a barren stock, with bare existence,
But like a shelt'ring fruit-producing tree !
So did I find how little things external,
Make up of life, the gladness and the light ;
If but the soul descry the things supernal,
Blindness must fail to constitute a night !"

Should the life of Dr. Gale be spared, it promises to become one of extraordinary usefulness to his fellow-men. True, some have objected to the military character of his principal inventions ; but so long as war is resorted to by the nations of the earth, so long will it be necessary for us to keep abreast with other countries in the development of the arts of warfare. Besides, it becomes every day more and more clear that the more destructive the power of contending armies, the more impregnable or effective the means of aggression or defence, the greater the chances of peace. Wars are far less common at the present time than in ancient days, and we fervently trust—Utopian as the hope may seem—that with the continued progress of social and political enlightenment, the sounds of warlike conflict may speedily cease from the face of the earth. Perhaps that time is nearer than many of us imagine. It is true that never, perhaps, was there a period when

armaments were so large, and the rumours of war were more frequent. "But"—as Lord Stanley has thoughtfully observed—"this cannot last always. Out of this state of confusion and transition there must of necessity come a better state of things. There are financial, among other reasons, why this cannot go on much longer, since military expenditure must nearly have reached its limit; when there will come a period of comparative disarmament, and, let us hope, of general peace."

Notwithstanding the manner in which Dr. Gale's time is largely occupied by the working of his numerous inventions; the ceaseless requirements of his professional duties; his benevolent exertions on behalf of his sightless brethren; and the large number of interviews with inventors and others; he has—somehow or another—contrived to find leisure to assist in various enterprizes of a social or religious character. Thus we find him acting as chairman of building companies, hospitals, religious associations, etc., besides assisting in various ways many philanthropic projects in which he takes an interest. Surely such a career of untiring energy and usefulness cannot but afford a most encouraging example to those who may feel too faint, too weary, too hopeless, to enter with spirit on the great battle of life. If a blind man could effect this much, what excuse can be made for those who, enjoying the full use of their

faculties, prefer to idle away their lives in doing nothing, allowing the talents with which their Maker has so generously endowed them to rust and become worthless! No man, be he ever so poor, ever so weak, but can do something if he will only strive. Perseverance and self-reliance combined will conquer the most formidable difficulties, even those entailed by the hand of infirmity or affliction. The history of James Gale, like that of John Kitto, shows that what frequently appear to be the most terrible of calamities are often governed by the great law of compensation; and that He who hath made the blind to see and the deaf to hear, can mercifully temper the force of affliction, and transform that which seemed a curse into a blessing. "Better rub than rust," sang sturdy Ebenezer Elliott, and so say we. What if sound departs from our ears? What if the powers of sight be denied us? Better rub than rust. We shall be none the worse for it; we may be much the better. Work is the grand duty of life, and be we possessed of all that health or strength can give, or be we cruelly smitten by the hand of suffering, let us not forget our daily obligation, but consider the proud resolve of James Gale, who, when told that he was to become blind, to behold no more the glorious light of day, determined never to become disheartened, never to falter in his onward course, but to press steadily forward, trusting

in God and in his own exertions for ultimate success. How far he has succeeded—how far he has triumphed—let the pages of this volume declare.

THE END.

